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## ARALIA SPINOSA.

BY JOSIAH KIRBY LILLY, PH.G.

*From an Inaugural Essay.*

Noticing the great differences in the results of former investigations of aralia bark, the writer performed a series of experiments, in hopes of determining the nature of the principles to which the drug owes its slightly aromatic odor, bitterish and acrid taste.

The odor of the bark proved to be due to a volatile oil, present in very minute quantity. By distilling eight ounces of the ground drug with water a few yellowish-green globules of the oil were separated. They possessed an aromatic, somewhat camphoraceous odor, and gave with litmus an acid reaction.

On continuing the distillation, with the addition of solution of potassa, no other volatile principles were observed.

The bitter taste resides in an amorphous, extract-like mass, soluble in ether, alcohol and water, insoluble in petroleum benzin and is not precipitated by neutral or subacetate of lead. The process by which it was obtained is as follows: The drug was exhausted with alcohol, this removed by distillation until the residue assumed the consistence of syrup; this residue was then precipitated in water, the resinous precipitate separated by filtering, and the filtrate evaporated to a soft extract, which was treated repeatedly with stronger ether. The ether solution on being allowed to evaporate spontaneously left a yellow mass, which, when dissolved in water and allowed to stand, separated crystals; the mother water from which, upon being evaporated, yielded the bitter mass already described.

It was also separated from an extract, resulting from the evaporation of a decoction by treating it with stronger ether, and proceeding with this ether solution as with the one above.

The crystals that were separated from the bitter principle possessed a taste which was at first saline, then developing a slight astringency;

they are freely soluble in ether and alcohol, less so in water, and are entirely volatilized at a red heat.

The acrid principle is a resin, which I obtained in the form of a gray powder, possessing a strong and persistently acrid taste, insoluble in ether, soluble in alcohol. It is the resin remaining after treating with stronger ether, the resinous precipitate yielded by the alcoholic extract in water.

The portion of this resinous precipitate which was soluble in ether consisted of a tasteless resin and much green coloring matter, undoubtedly chlorophyll.

In distilling for volatile oil, preparing decoctions, infusions, etc., much trouble was experienced through the formation of a dense and persistent froth. Steps were taken to separate this saponaceous principle with the result of obtaining it in the form of a nearly white powder, inodorous, possessing a slightly acrid taste, freely soluble in water and dilute alcohol, almost insoluble in alcohol, and entirely insoluble in ether and chloroform. A process by which it was isolated is as follows: The extract procured by evaporating a cold infusion was treated with stronger ether to remove the bitter principle, and the residue thoroughly washed with dilute alcohol; this solution was evaporated to an extract and dissolved in water. The aqueous solution yielded with a solution of lead acetate a scanty precipitate, which was separated by filtration. The filtrate gave with solution of subacetate of lead a copious precipitate, which was collected, well washed, the lead removed by suspending in water, and passing hydrosulphuric acid through the solution, and the filtrate evaporated. The product of this evaporation proved to be this saponin-like substance; it was much improved in color by dissolving in a small quantity of hot alcohol, from which it reprecipitated upon cooling, the alcohol holding much of the coloring matter in solution. This principle may also be obtained by exhausting the ground drug with boiling alcohol, from which it separates upon cooling. On boiling this body in a very dilute solution of hydrochloric acid it proved to be a glucoside, yielding glucose and an insoluble white substance.

To this principle I think the name "araliin" could be very properly applied. The araliin of Holden ("Am. J. Ph.," Aug., 1880), is described as "a yellowish substance in scale foaming excessively upon agitation" and is very probably this substance incorporated with some foreign matter.

The alkaloid announced by Elkin (Am. J. Ph., Aug., 1880) as existing

in aralia bark could not be found. No precipitates were formed when Mayer's test, or a solution of iodine in iodide of potassium, were added to an acidulated infusion or decoction, nor to the solution resulting after treating an alcoholic extract with acidulated water.

No reactions were given indicating the presence of tannin. A green color was produced by ferric chloride, but a solution of gelatin caused no precipitate with a somewhat concentrated decoction. Glucose was indicated by Trommer's and Fehling's tests, as was starch by iodine. Milk of lime precipitated pectin from an acid decoction. Albumen was not coagulated upon boiling a cold infusion.

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### IMPROVEMENT ON TINCTURA ARNICÆ, U. S. P.

BY CHAS. H. HÆNTZE.

As the official tincture of arnica is very seldom used as an internal medicine, but more so externally, it might be well here to propose a slight improvement, deviating somewhat from the U. S. P.: Take of arnica flowers 6 troyounces; alcohol  $1\frac{1}{2}$  pint; water  $\frac{1}{2}$  pint. First take the arnica flowers and rub in a mortar with 2 drachms of sodium carbonate until quite fine, then take the powder and put in a 2-pound tin percolator of the Rosenwasser pattern, and percolate with the diluted alcohol, raising the reservoir about five feet above the percolator; the result is a quart of dark, clear and strong tincture, and as the quantity of carbonate of sodium is so small it would be hardly objectionable. This same tincture may be made by maceration, but as the latter takes up a great deal of precious time, the former way is preferable. Also the often seen precipitate does not appear in this process.

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**Preparation of Aniline.**—Arau proposes heating a mixture of carbon bisulphide 1 part and ammonia 2 parts to  $50^{\circ}\text{C}$ .; then binitrobenzol is added, and the gas generated is conducted into another vessel containing binitrobenzol; or the vapors given off from the above mixture at  $50^{\circ}\text{C}$ . are conducted through several vessels containing binitrobenzol until this is completely reduced to aniline. The wash water contains ammonium sulphocyanide, and may be utilized for obtaining the potassium salt.—*Chem. Zeitung*, 1882, No. 30, p. 585, from *Monit. Prod. Chim.*, xii, 145.

## SOLUBILITY OF COMMERCIAL SULPHATES OF MORPHINE.

BY VIRGIL COBLENTZ, PH.G.

An article on this subject appeared in the March number of this journal by Prof. Power, giving the conflicting statements on the solubility of sulphate of morphine, and at the same time making an accurate determination of the solubility of the salt as made by Rosengarten & Sons. The object of this article is the determination of the differences in the degree of solubility of this salt as produced by different manufacturers and found in our markets. The method employed to determine the solubilities is that recommended by Dr. Power, viz.: "An excess of sulphate of morphine was digested with distilled water at 15°C. for several days with frequent agitation, and the solution filtered from the excess of salt (proper temperature being observed), the amount of sulphate of morphine contained therein was determined by precipitation with chloride of barium, and from the ignited amount of barium sulphate the amount of crystallized sulphate of morphine,  $(C_{17}H_{19}NO_3)_2 \cdot H_2SO_4 + 5H_2O$ , was inversely calculated."

Example.—16.363 grams of cold saturated solution gave .2650 gram of sulphate of barium, corresponding to .8625 gram of crystallized sulphate of morphine.

$(BaSO_4)232.8 : (C_{17}H_{19}NO_3)_2 HSO_4 + 5H_2O)758 :: .2650 : x. \quad x = .8625$  gram morphine sulphate crystallized.

(Solution)  $16.336 : (Morph. Sulph.) .8628 :: 100 : x.$

$x = 5.272$  per cent., and  $100 : 5.272 = 18.97$  parts of water.

Sample.	Weight of			One part of the salt soluble at 15°C. in
	Solution.	BaSO <sub>4</sub>	Morph. Sulph.	
I.	11.000 gm.	.1580 gm.	.5145 gm.	21.38 water.
II.	21.808 "	.2801 "	.912 "	23.90 "
III.	17.508 "	.232 "	.7554 "	23.18 "
IV.	13.020 "	.226 "	.7359 "	17.69 "
V.	16.363 "	.265 "	.8625 "	18.97 "
Average,				21.00 water.



The samples were those of Powers & Weightman, Rosengarten, Merck, T. & H. Smith, and Chas. T. White.

In round numbers one part of this salt requires from 18 to 24 parts of water at 15°C. for solution.

## SOME NEW PREPARATIONS OF THE HYPOPHOSPHITES CONTAINING IRON.<sup>1</sup>

BY C. LEWIS DIEHL.

Several years ago I was requested by a physician to prepare for one of his patients a pleasant combination of the hypophosphites of iron and quinia, if possible, in the form of an elixir, and in as nearly a neutral condition as practicable. After some experiments I succeeded in making a very acceptable preparation—in fact, an elegant elixir, containing in each fluidrachm one grain of each of the salts named, in perfectly neutral combination. The successful production of this preparation led me to apply the chemical facts involved to the production of other combinations of hypophosphites containing iron, some of which have been received with decided favor by the physicians whose attention I have been able to invite to them. Thinking that possibly these preparations may merit more extended use, and that at all events they are interesting combinations, I have concluded to make known their formulas and the methods of their preparation in the following:

So much has been written about the hypophosphites, and there is so much diversity of opinion as to the best mode of their exhibition, as well as of their therapeutic value, that I deem it necessary only to briefly note the points that seem to make it desirable that preparations of hypophosphites containing iron should be prepared as below recommended. The preparation of hypophosphites which has found most favor in this country is the so-called "Churchill's syrup of the hypophosphites." Whether Dr. Churchill's original syrup was one containing only hypophosphite of calcium, as seems to me probable, or whether it conformed to one or the other of the formulas for "syrup of the hypophosphites" proposed by Mr. W. S. Thompson, of Balti-

<sup>1</sup> Read at the meeting of the Kentucky Pharmaceutical Association, in Covington, May, 1882. Reprint from the "Louisville Medical News," communicated by the author.

more, and by the late Prof. Wm. Procter, Jr.,<sup>1</sup> I am unable to decide, but this much is certain, that these two formulas have been authoritative for American pharmacists, though it by no means follows that they have been uniformly followed. The two formulas differ essentially only in that Mr. Thompson directs the *ferrous* salt, while Prof. Procter's formula requires *ferrie* hypophosphite. The latter produces a permanent and generally acceptable preparation, the only objection being the presence of free hypophosphorous acid. The preparation of Mr. Thompson, which also contains free hypophosphorous acid, is preferred by some because it contains the iron in the condition of ferrous salt; but the latter is easily changed, and the preparation is therefore not so satisfactory.

In the preparations prepared by me the ferric salt is used, as in Prof. Procter's formula, but instead of effecting its solution by means of hypophosphorous acid, citrate of potassium is employed, a handsome greenish and perfectly neutral solution being formed. The quantity of the citrate necessary for this purpose is about equal to that of the dry ferric salt, but the latter is preferably prepared freshly and dissolved while still moist. The citrates of ammonium or sodium would answer the purpose of solvent as well as the potassium salt, which was selected only because it is always at hand, and because the ammonium and sodium salts are not known to possess any advantage. For the preparation of the ferric hypophosphite any of the soluble salts of the hypophosphorous acid will answer, but I have selected the hypophosphite of calcium, with ferric chloride as precipitant, for the reason that it is the salt most commonly kept in quantities, and because it is the cheapest. Certain precautions must, however, be observed to secure the perfect precipitation of ferric hypophosphite, for if too much or an insufficient quantity of ferric chloride is added, a portion of the hypophosphite remains in solution and is lost during the washing of the precipitate, which must be done with the smallest possible quantity of water. It may be well, therefore, to give particular consideration to the

*Preparation of the Ferric Hypophosphite.*—Dissolve 150 grains of the hypophosphite of calcium in 4 fluidounces of distilled water, if necessary, by the aid of gentle heat, and filter the solution. To the cold solution carefully add solution of ferric chloride so long as a precipitate is produced. Collect the precipitate upon a close muslin

<sup>1</sup> Parrish's Pharmacy, third edition, 1864, pp. 429, 430.

cloth, drain well, and express firmly; then pour upon the magma one fluidounce of distilled water, and express again. The magma may then at once be dissolved by the aid of citrate of potassium.

When precipitating this compound it is best to add the ferric chloride in small portions at a time and to stir the liquid constantly. Then allow the precipitate to subside, so that the supernatant liquid may become clear before adding the next portion of ferric chloride. Toward the last a small portion of the clear supernatant liquid is removed after each addition and tested with diluted ferric-chloride solution, allowing it to stand for several minutes if no immediate turbidity occurs. If the liquid remains clear after several minutes' standing, the precipitation may be regarded as complete, and the straining and washing may go on as above directed. The product is equal to 128 grains of dry ferric hypophosphite.

Having thus explicitly given the method of obtaining the magma of ferric hypophosphite, these directions do not need repetition in the formulas for the different preparations given below. As regards its solution by the aid of citrate of potassium, it is only necessary to triturate the magma with the specified quantity of the latter, when partial solution will occur, and complete solution follows upon the addition of water, or of the solution of the other hypophosphites.

I. *Improved Syrup of the Hypophosphites with Iron.*—Take of hypophosphite of calcium 256 grains; hypophosphite of sodium 192 grains; hypophosphite of potassium, 128 grains; ferric hypophosphite (represented in the magma obtained from 128 grains of hypophosphite of calcium), 96 grains; citrate of potassium, 96 grains; white sugar, 13 troyounces; orange-flower water, 1 fluidounce; distilled water, a sufficiency. Dissolve the calcium, sodium, and potassium hypophosphites in 7 fluidounces of the water, if necessary, by the aid of a gentle heat, and filter the solution. Triturate the magma of the ferric hypophosphite with the citrate of potassium, add the solution of the other hypophosphites, and when complete solution is effected, the orange-flower water and sufficient distilled water to make the whole measure 9 fluidounces. In this dissolve the white sugar, without heat, and filter the resulting syrup through paper. A fluidrachm of this syrup contains 2 grains of the calcium,  $1\frac{1}{2}$  grain of the sodium, 1 grain of the potassium, and  $\frac{3}{4}$  grain of the ferric hypophosphite.

II. *Syrup of Hypophosphite of Iron.*—Dissolve 128 grains of ferric hypophosphite (represented in the magma from 150 grains of hypo-

phosphite of calcium), by the aid of 128 grains of citrate of potassium, in 1 fluidounce of orange-flower water, and sufficient distilled water to make the solution measure 9 fluidounces. In this dissolve 13 troyounces of white sugar, and filter the resulting syrup. 1 fluidrachm of this syrup contains 1 grain of the ferric hypophosphite.

III. *Elixir of Hypophosphite of Iron.*—In the 9 fluidounces of solution of ferric hypophosphite, obtained as above (II), dissolve 4 troyounces of white sugar, and add 5 fluidounces of alcohol, in which 8 drops of fresh oil of orange have been previously dissolved; then filter. The strength of this is the same as that of the syrup, over which it probably possesses no advantage.

IV. *Elixir of Hypophosphite of Iron and Quinine.*—Make a solution of ferric hypophosphite, as under II, but bring it only to the measure of 7 fluidounces, and dissolve 4 troyounces of white sugar in it. Triturate 128 grains of sulphate of quinine with 5 fluidounces of strong alcohol, add a solution of 30 grains of hypophosphite of calcium in  $\frac{1}{2}$  fluidounce distilled water, and shake the mixture occasionally for an hour. Then filter and wash the filter with sufficient strong alcohol to make the filtrate measure 7 fluidounces. In this dissolve 8 drops of fresh oil of orange, add it to the solution of ferric hypophosphite, mix well and filter. A fluidrachm of this elixir contains 1 grain of the hypophosphite of quinine and 1 grain of ferric hypophosphite.

V. *Elixir of Hypophosphite of Iron, Quinine and Strychnia.*—This is the above elixir (IV), containing  $\frac{1}{128}$  grain of hypophosphite of strychnia in the fluidrachm, and is made by triturating 1 grain sulphate of strychnia with the sulphate of quinine and alcohol, and increasing the quantity of hypophosphite of calcium by 1 grain.

VI. *Elixir of Calisaya with Hypophosphites.*—This is the "elixir of calisaya" proposed by me in 1866,<sup>1</sup> containing hypophosphites in such proportion that 2 teaspoonfuls represent 1 teaspoonful of "improved syrup of the hypophosphites with iron" (I). It is therefore necessary to reproduce the formula for the elixir of calisaya, as modified for this purpose.

Take of calisaya bark 24 troyounces, curacao orange peel 16 troyounces, coriander 4 troyounces, cinnamon 3 troyounces, cardamom  $1\frac{1}{2}$  troyounce, anise seed 1 troy ounce, cocoa (Baker's) 8 troyounces. Having reduced these ingredients to a moderately fine powder, dis-

<sup>1</sup>"American Journal of Pharmacy," x1, p. 104.

place them with a mixture of 1 volume of strong alcohol and 3 volumes of distilled water, until 2 gallons of percolate are obtained.

Meanwhile prepare from 6 pints of solution of tersulphate of iron, hydrated sesquioxide of iron by the formula of the Pharmacopœia, measure the magma, and add to every 4 volumes 1 volume of strong alcohol; then add of this mixture sufficient to the percolate, obtained as above, to deprive it of its cincho-tannic acid. The absence of the latter is readily ascertained by the addition of a drop of muriated tincture of iron to a filtered portion of the liquid, which should not be colored by such addition. Should coloration result, the intensity or faintness will serve as a guide to the further addition of the ferric oxide. As soon as de-tannation is effected, filter the whole through a double muslin cloth, express the residue under a press, filter this portion, add to that first obtained, and measure the united filtrate. Add to the residual magma on the cloth sufficient of the above-described mixture of alcohol and water to make, when again expressed and filtered, the united filtrates measure 3 gallons. Now triturate 2 fluidrachms of fresh oil of orange with 4 troyounces of prepared chalk, incorporate this with the 3 gallons of de-tannated "cinchona liquor," and agitate occasionally for 24 hours, and then filter.

The "cinchona liquor" so obtained is just twice the strength of the "elixir of calisaya" above referred to, and when mixed with an equal volume of "improved syrup of the hypophosphites with iron" forms the "elixir of calisaya with hypophosphites."

VII. *Elixir of calisaya and hypophosphites with strychnia* may be made by dissolving 1 grain of strychnia by the aid of a few drops (or just sufficient) of hypophosphorous acid in 1 fluidrachm of distilled water, and adding sufficient of the above elixir (VI) to make 1 pint. A dessertspoonful contains  $\frac{1}{84}$  grain of strychnia.

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**Acid-proof Cement.**—One part of caoutchouc and two parts of linseed oil are melted together and the mass thoroughly mixed with sufficient white bole until the proper consistence is obtained. This cement becomes somewhat softer by heat, is not attacked by hydrochloric or nitric acid, and does not readily harden; to facilitate the latter it may be mixed with one-fifth litharge or red lead.—*Polyt. Notizbl.*



## ANALYTICAL RESEARCHES AND INVESTIGATIONS.

COLLATED BY PROF. FREDERICK B. POWER, PH.D.

*Estimation of Resin with Fats.* By T. S. Gladding.—The author recommends the following method for the quantitative estimation of resin, when accompanied by fats, which is based upon the insolubility in ether of the silver salts of the fatty acids, while the resinates of silver is readily dissolved in large amounts; a small amount of alcohol which may be contained in the ether exerts no objectionable influence.

About 0.5 gram of the fatty acids containing resin is brought into a small flask, 20 cubic centimeters of 95 per cent. alcohol added, and the mixture shaken until the fatty acids and resin are dissolved. One drop of a phenolphthaleïn solution is then added, and subsequently a saturated alcoholic solution of potassa, drop by drop, with constant agitation, until the red coloration which designates the excess of alkali becomes permanent. One or two drops of the potassa solution are afterwards added in excess, the mixture maintained at the temperature of boiling alcohol for ten minutes upon the water-bath, in order to ensure the complete saponification of the fat; after being allowed to cool the contents of the flask are washed by means of concentrated ether into a graduated cylinder, holding 100 cubic centimeters, which is afterwards filled with ether. The contents of the cylinder are mixed by agitation, one gram of very finely powdered neutral nitrate of silver added, and the whole actively shaken for 10 or 15 minutes, until the flocculent precipitate of stearate and oleate of silver has aggregated and become deposited, whereupon from 50 to 70 cubic centimeters of the clear liquid, filtered, if necessary, are brought into a second graduated cylinder of the capacity of 100 cubic centimeters. To this liquid a small additional amount of nitrate of silver is added in order to determine whether the fatty acids have been completely precipitated, in which case the liquid will remain clear. 20 cubic centimeters of a mixture of one part of hydrochloric acid and two parts of water are then added, and actively agitated, whereby the complete decomposition of all the silver salt is accomplished, and after being allowed to subside a definite amount of the supernatant ethereal resin solution is separated, and evaporated in a platinum capsule on the water-bath to dryness. The residue is then weighed, and consists of the resin, which can contain at the most only traces of accompanying oleic acid.

The utility of the described method has been tested by the author.

with mixtures of resin and fatty acids in known proportions, and has proved perfectly satisfactory. It is particularly adapted for the technical examination of soap, to which resin is frequently added, and in this case the previous separation of the fatty acids may be avoided by dissolving the scraped soap directly in alcohol, and proceeding as above described.—*Pharm. Zeitung*, No. 49, 1882, p. 361, from *Chem. News*.

*Detection of Salicylic Acid in Foods.*—This is usually accomplished by agitating the substance to be examined with ether, benzol or carbon bisulphide. The method is, however, circumstantial, and is not applicable in the presence of fats. The following simple and reliable method, perfected in the laboratory of the "Chemiker-Zeitung," is based upon the volatility of salicylic acid with aqueous vapor. If a liquid, wine, beer, milk, etc., is to be examined, about 100 cubic centimeters of the same are brought into a flask connected with a Liebig's condenser, and distilled as quickly as possible. A few drops of the distillate are collected from time to time, and tested with pure, neutral ferric chloride; if a violet coloration ensues, salicylic acid is present. From dilute solutions the salicylic acid does not distil so readily as from concentrated. A liquid, *e. g.*, which contained 0.005 per cent. of salicylic acid gave in the first half of the distillate only a very feeble reaction, while two drops of the following portion assumed with ferric chloride an intense violet color. Salicylic acid is not volatile with alcohol vapors, and likewise not in the presence of tannin; in the latter case, and when contained in red wine, it suffices to acidulate with sulphuric acid in order to obtain perceptible amounts of salicylic acid in the distillate.

If non-volatile substances, such as butter, are to be examined a sufficient amount is brought into a flask, an active current of steam led through the mass, and the distillate tested as above. With slight traces of salicylic acid which are no longer detectable in the distillate by ferric chloride (0.0005 gram dissolved in 100 cubic centimeters of water yields an intense coloration), a large amount of the distillate is slightly supersaturated with ammonia, and evaporated on the water-bath to dryness. The residue is then dissolved in a little water, and tested with ferric chloride; if the violet coloration does not now appear the absence of salicylic acid is proven.

It is still to be observed that the violet coloration does not appear in the presence of free acids, alkalies, or large amounts of salts.—*Chem. Zeitung*, No. 32, 1882, p. 619.

## ANALYSIS OF WINE.

BY J. NESSLER AND M. BARTH.

I. *Determination of the Amount of Extract.*—The methods at present in use for the determination of the amount of extractive in wine differ from one another not only in subordinate details, but also in principle, according as extract is understood to mean the constituents of the wine absolutely non-volatile without decomposition, or the wine deprived of its water, alcohol and volatile acids. In the former case it is especially necessary to volatilize the glycerin completely without partially decomposing the non-volatile constituents of wine through submitting them to too high a temperature. Determinations of extract in this manner are usually made with only a small quantity of wine (5 or 10 cc.), which is heated upon a water-bath so long as water is perceptibly driven off, and the drying is then continued in an air-bath at  $110^{\circ}$  C., or preferably *in vacuo* until the weight remains constant. The other kind of determination has for a special object the retention of the glycerin as completely as possible in the extract. This can be effected either by avoiding raising the temperature above  $100^{\circ}$ , or by making an addition to the wine which will prevent the volatilization of the glycerin at a temperature of from  $110^{\circ}$  to  $115^{\circ}$  C.

In estimating a wine extract the authors concentrate 50 c.c. of the wine to a syrupy consistence on a water-bath, and then further dry it for three hours at the temperature of boiling water. In order to maintain this temperature exactly they used a jacketed apparatus, arranged like a paraffin drying chest, the interspace being filled with boiling water, and made sufficiently large for the water to be maintained in vigorous ebullition during four hours without exhaustion.

In order to ascertain whether in this process access of air exercised an essential influence upon the weight of the extract parallel experiments were made in which 25 cc. of wine were placed in each of two platinum boats, enclosed in test-tubes, and arranged so that whilst side by side in the above-mentioned drying chamber a current of dried coal gas could be passed over one and a current of dried air over the other. A thermometer fixed in the drying chest showed that when the water was boiling vigorously the temperature in the interior was  $100^{\circ}$  C. After heating for eight and ten hours the residue was weighed with the following results:

	Eight hours.	Ten hours.
Current of coal gas, . . . .	1·84 per cent.	1·80 per cent.
Current of air, . . . .	1·90    "	1·86    "

The difference between the results of the two estimations is probably due to the extractive matter in the one case taking up oxygen from the air; but it is not considered sufficient to constitute an essentially larger quantitative result in drying under access of air than in a current of coal gas.

If the wine be first evaporated upon a water-bath in an open platinum dish to a syrupy consistence it only requires to be heated for three hours in the drying chest before reaching a point where the difference between two weighings is dependent entirely upon the volatility of the glycerin. Experiments made to determine the extent of this volatility showed that it amounted to about 10 per cent. of the glycerin present during the evaporation on the water-bath and another 4 per cent. in the drying chest. So that a wine containing 1 per cent. of glycerin would lose about 0·14 per cent. through its volatilization during evaporation and drying; but in a low wine, which with 5 or 6 per cent. of alcohol would probably contain only 0·4 per cent. of glycerin, the loss would only amount to 0·05 per cent. If, however, the extract be dried at 110°C., experiment has shown that in this part of the operation alone, in three hours, about 10 per cent. of the glycerin present is driven off, so that at the end of the drying the total loss is considerably larger than in drying at 100°C.

Alteration in the other constituents of the extract is relatively small when the drying is effected at 100°C. Fifty cc. of wine, containing 0·47 total acids, was evaporated to the consistence of a syrup, then heated further for half an hour upon a water-bath, after which the non-volatile acid amounted to 0·36 per cent. The extract of the same wine after drying three hours at 100° showed upon titration 0·28 per cent.; that dried at 110°C. showed 0·22 per cent.; and that dried at 120° C. 0·11 per cent. of non-volatile acid.

Grete has recommended that in order to obviate the decomposition of the non-volatile constituents of the extract during drying, and especially to entirely prevent volatilization of glycerin, the wine should be evaporated with a measured quantity of titrated baryta water. Some experiments have been made by the authors to determine (1) whether an indifferent body like glycerin actually enters into chemical combination with caustic baryta so as to be no longer volatile at 110°C.;

and (2) whether, if this be the case, the quantity of extract usually present in 10 cc. of wine is sufficient to combine chemically with the whole of the baryta in 10 to 15 cc. of baryta water of ordinary strength, so that in the dry residue no barium hydrate shall be present, since the reckoning of a variable amount of it as BaO would affect the result. An Alsace wine of 1876 was used, and it was found that the first of these questions must be answered in the affirmative, 0.489 per cent. out of 0.5 per cent. of added glycerin being recovered. As to the second, it was found that when 10 cc. of baryta water was used it was certainly all combined, and that this was also the case with 15 cc., unless the wine was particularly poor in extract. The partial decomposition of the nitrogenous organic constituents, which is made evident by the odor of trimethylamine when the extract containing baryta is heated, does not appear to exercise any essential influence upon the weight of the extract, whilst the acids of the wine, in the form of barium salts, better resist decomposition at a high temperature than in the free state.

This method has, however, the disadvantage that the same wine would be made to appear considerably richer in extract by the presence of traces of acetic acid, because whilst this would have been produced from the alcohol, it would be weighed with the extract. But the purpose of the adulterator, who had added glycerin to make up for the want of extract in a wine which had been diluted before fermentation with alcohol and water or sugar and water, would be thus served, as the extract would be brought up to the normal quantity, whilst in external characters the extract containing baryta from a diluted wine that has been treated with glycerin does not differ from that of a natural wine. In practice, therefore, in many cases an estimation of the acetic acid and glycerin would also be necessary. As previously mentioned, by far the greater portion of the glycerin present in wine is retained in the extract. A wine, therefore, to which any considerable quantity of glycerin had been added would yield an extract that is soft and viscous even after three hours' drying, whilst the extract from a natural wine is hard and generally bulky and blistered, or at the most,—where the wine is strongly alcoholic through fermentation, which increases the normal quantity of glycerin,—is plastic, somewhat like hard dough.

Hager has compiled a table<sup>1</sup> by the help of which the amount of

<sup>1</sup> "*Zeitschrift f. analyt. Chemie*," xvii, 502.



extract in a wine can be ascertained from the specific gravity of the liquid after being deprived of alcohol. In almost all the completely normal wines the quantity of extract found by the above method corresponded within two to three hundredths per cent. to that indicated by Hager's table. If the wine contains sugar still unfermented, or unfermentable constituents of potato sugar, then usually the extract calculated is somewhat higher than what is found; but if, on the contrary, it contains an abnormal quantity of glycerin the extract calculated is considerably less than what is actually found. Therefore, it is always advantageous to compare the amount of extract calculated according to Hager's tables with that found by the method described. This method does not do away with the necessity for an estimation of the glycerin itself in such wines as may be suspected to have received an addition of glycerin.

The authors have applied this method in the estimation of the extract of several hundred kinds of undoubtedly genuine wines of different years and from widely separated districts. The results of these determinations are set out in a tabular form in a separate communication.<sup>1</sup> It was found that the absolute quantity of extract in pure natural wines may vary within very wide limits. Among other conditions exercising an essential influence upon it are the nature of the soil of the district in which the wine is grown, the situation of the particular vineyard, the weather, degree of ripeness of the grapes, the course of the fermentation, and unskillful treatment of the wine, which may induce a considerable alteration in the composition of the extract without any foreign addition being made.

The amount of extract present in pure, completely fermented wine stands in definite relation to the acid present. It amounted in none of the genuine wines examined by the authors, after the deduction of the free acid of the wine, to less than 1 per cent. It may happen that a genuine wine may contain less than 1 per cent. of extract free from acid; but in such cases the *non-volatile* acid is determined, and after deducting this fixed acid from the total extract there is always a residue, amounting to at least 1.1 per cent. The estimation of the fixed acid is made with sufficient exactitude by evaporating 20 cc. of the wine to a syrupy consistence, heating it further for half an hour to an hour on a water-bath, subsequently treating it with hot water and titrating after it has cooled.

<sup>1</sup> "Zeitschrift f. analyt. Chemie," xxi, 198.

But a larger proportion of extract than 1 per cent. after deduction of total acids may be expected—

(1) In wines which contain much sugar still unfermented, but in which from any cause fermentation is stopped. The fully fermented dry wines usually still contain a small quantity of sugar, which may vary between 0.01 and 0.001 per cent. The minimum of extract free from acid to be expected in a natural wine would exceed 1 per cent. by as much as the quantity of sugar as ascertained under suitable precautions by means of Fehling's solution exceeds 0.1 per cent.

(2) In wines from certain districts which are known by experience to produce in their best years a relatively full-bodied wine.

(3) In red wines. In these the smallest amount of acid-free extract is usually 1.2 per cent.; but in "berry wines," and in such red wines as have stood only for a very short time over the husks and stalks, the minimum is exceptionably 1 per cent.

Wines rich in ash also stand higher in respect to amount of extract. If a wine yields much ash and gives relatively little extract, and if in addition the ash is easily fusible and not blackened by incineration, then the authors think there is reason to suspect that the wine consists partially of the product of fermentation of a solution of sugar over wine residues.

Provided that the total amount of extract, free from ash and sugar, does not sink below a certain quantity, it may vary very considerably in composition according to the quality of the wine. For instance, since glycerin is a by-product of fermentation, and may amount to from 7 to 10 per cent. of the weight of alcohol produced, a clear natural wine, rich in alcohol, would evidently contain more glycerin than one poor in alcohol. Another portion of wine extract consists of pectin bodies, which occur, however, in less quantity in proportion to the ripeness of the grapes used in making the wine. Very ripe grapes, rich in sugar, leave after fermentation relatively much glycerin and little pectin substance, while with unripe, very acid grapes, poor in sugar, the contrary is the case.

The ash constituents amount on the average to about 10 per cent. of the entire weight of the extract, but this amount is not an indispensable characteristic of a pure wine, since it may be affected by various conditions. For instance, a wine may be rich in extract, but not in ash, when it contains a considerable quantity of unfermented sugar; or the ash may be low through separation of tartar not only when a wine

contains much alcohol, but when it has been exposed for a long time to a low temperature, which causes a separation of the tartar in crystals that do not redissolve on the normal temperature being restored. The total amount of ash found by the authors in genuine wines did not fall below 0.14 per cent.

II. *A Modification of Neubauer's Test for Potato Sugar in Wine, and the Optical Behavior of Pure and Saccharated Wines.*—Neubauer's method for the recognition of an addition of potato sugar to wine or must is based upon the optical behavior of the wine in a polarimeter. Whilst pure natural wine, which contains unfermented fruit sugar, rotates the plane of polarized light to the left, and completely fermented wine is quite neutral in its behavior or rotates the plane only a few tenths of a degree of Wild's scale to the right, a fermented potato solution has a considerable residue of strongly dextrogyre constituents, which are not sugar. According to recent experiments by the authors with various kinds of commercial potato sugar, even the best qualities, pure white and in crystalline granules, contain from 15 to 18 per cent. of unfermentable substance, each 1 per cent. of which, in 200 mm. tubes, has a dextrogyre action of  $1.5^{\circ}$  (Wild). Consequently  $1^{\circ}$  of rotation by the fermented wine due to this cause would, on the average, correspond to an addition of 4 kilos of potato sugar to the hectoliter of wine. In the presence of unfermented sugar this result would be modified: 1 per cent. of sugar rotates about  $1.25^{\circ}$  to the right, so that  $1^{\circ}$  of rotation, due to unfermented potato sugar, would correspond to about 800 grams of chemically pure grape sugar in the hectoliter. But inferior kinds of potato sugar contain from 26 to 30 per cent. of the unfermentable substances, which do not reduce Fehling's solution.

As before mentioned, wine frequently contains a small quantity of a dextrin-like constituent, capable of exercising a slight dextrogyre action amounting to  $0.03^{\circ}$  to  $0.6^{\circ}$  (Wild). But this substance is almost completely insoluble in alcohol, whilst the greater portion of the dextrogyre residue from fermented potato sugar is soluble in  $90^{\circ}$  alcohol. Upon this fact Neubauer based a method of distinguishing between the slight dextrogyre action of a normal wine and that of one containing potato sugar. The method, however, has the defect of admitting the possibility of the result being affected by the presence in the test solution of free tartaric acid, which also has a dextrogyre action. It is, therefore, proposed by the authors to modify it as follows:

210 cc. of wine, after the addition of a few drops of concentrated solution of potassium acetate, is evaporated to a thin syrup, treated with 90° alcohol, the alcoholic solution decanted when perfectly clear or filtered, water added, and the liquid decolorized with animal charcoal, evaporated to about 15 cc., filtered, the filter washed and the filtrate brought up to 30 cc. (one-seventh of the original volume of the wine) and polarized. If the resulting liquid shows a rotation of more than 0.6° (Wild) the wine may be considered with certainty to contain potato sugar.

If a wine contain non-inverted and unfermented cane sugar, which would probably have been added to it after fermentation to increase the amount of extract, the dextrogyre action of such a wine would be changed into a levogyre action during the evaporation even by the influence of the natural acids, but more certainly if a few drops of hydrochloric acid be added. The presence of unfermented cane sugar would therefore be indicated when a wine first shows a dextrogyre action and then after evaporation with hydrochloric acid shows a corresponding levogyre action.

A 6.5 per cent. solution of cane sugar, which rotated 8.4° to the right, was heated in a water-bath during three-quarters of an hour with some hydrochloric acid, brought to its original volume and polarized, when it showed a left-handed rotation of 2.2°. In order to test whether the inversion was quite completed, this solution was now kept in active ebullition for half an hour, evaporated water being restored as far as possible; it had then acquired, without any perceptible charring, a wine yellow color, and having been brought to its original volume, showed a left-handed rotation of 1.7°. A sugar determination with Fehling's solution gave 5 per cent. of invert sugar. It follows that a 1 per cent. aqueous solution of invert sugar rotates about 0.34° to the left (1 per cent. cane-sugar solution rotates about 1.3° to the right); that the inversion of a tolerably large amount of sugar is completely effected in three-quarters of an hour on the water-bath; and that by longer heating to a little over 100°C. (*i. e.*, to the boiling point of the sugar solution) a portion of the resulting invert sugar is again decomposed. When small quantities of cane-sugar are present the natural acids of the wine are sufficient to effect complete inversion during heating; but with larger quantities (1 per cent. and upwards) it must be assisted by a little hydrochloric acid. As soon as cane sugar in wine

has completely fermented its addition to the must can no longer be detected by optical means.

The question whether an addition of caramel to a wine exercises any influence upon its optical behavior has been answered in the negative by the authors' experiments, caramel proving to be optically inactive.

III. *Chlorine Determination and the Amount of Chlorine in Wine.*—

It is known that in the estimation of wine by experts an essential value is placed, among other things, upon the amount of ash found in it, and that manipulations for increasing its bulk considerably lower the proportion of incombustible substances that it yields. In order to cover this poverty of ash constituents an addition is often made of such salts as will remain completely dissolved in the wine and hence not raise suspicions, and for this purpose an addition of common salt to a sophisticated wine is not very extraordinary. But it is more common to use water from a spring rich in residual matter, by which means the lowering of the ash constituents through dilution of the wine is much lessened. Such waters, however, are often very rich in chlorine compounds, and therefore the estimation of chlorine in wines is not unfrequently of especial interest. But isinglass occasionally, though not very often, contains some added salt, so that the presence of a sophistication cannot be assumed with certainty upon the single ground of the occurrence of a somewhat too large quantity of salt.

All wines that contain abnormal quantities of common salt are distinguished by the ash not burning white so easily as that of most other wines: it pertinaciously retains carbon, and upon using a very strong heat in incinerating it probably fuses and a large portion of the alkaline constituents is volatilized. If the incineration residue be left to cool, treated with water so as to separate the salt from the carbonaceous particles, and then heated carefully so as to avoid spirting (a characteristic of common salt), a pure white ash will probably be obtained, but it will not contain all the salt. Further, if the extract be simply carbonized and then treated with water, the residue from the evaporation of the liquor cannot be looked upon as containing all the sodium chloride as such; because the organic acids of the wine, immediately upon being heated, and before they are decomposed, expel a considerable quantity of hydrochloric acid and eventually form carbonates. Consequently a chlorine determination of ash produced as carefully as possible gives the amount of chlorine compounds in a wine too low.

In the estimation of chlorine in original wines those quantitative



analytical methods which depend upon the use of potassium chromate as an indicator are not available, because the red-brown silver chromate is not insoluble in the free acids of wine. The previous neutralization of the wine results in the production of color during the reaction, which prevents the commencement of the end reaction from being distinguished with the necessary sharpness.

In using Volhard's method of determining chlorine white wine must be first decolorized with animal charcoal free from chlorine compounds, as the yellow tannin-like substances of the wine will produce with the ferric salt used as an indicator an intensely dark-green or black color, and even by this decolorization the production of color in the wine upon the addition of ferric salts, silver solution and potassium sulphocyanide cannot be entirely avoided.

A slight modification of Volhard's method induces a sharp end reaction and gives exact results. 40 to 50 cc. of decolorized wine is acidulated with nitric acid and treated with excess of titrated silver solution and titrated solution of potassium sulphocyanide added gradually, until a drop of the liquid allowed to fall into a drop of dilute solution of a ferric salt (iron alum) upon white porcelain shows a distinct red color. If the quantity of potassium sulphocyanide solution required be large, the experiment should be repeated, taking as small an excess of silver solution as possible. Twenty-five undoubtedly genuine wines from different districts (including five red wines) were examined for chlorine, and it was found that the normal amount of chlorine in wine does not exceed 0.005 per cent., whilst in most wines it is below 0.002 per cent. Five genuine "Markgräfler" wines, of the years 1822, 1862, 1868, 1870, and 1875, showed an amount of chlorine varying between 0.002 and 0.0025 per cent. Italian and similar wines, grown in the neighborhood of the sea-coast, frequently yield an easily fusible ash that does not burn perfectly white; but none have yet been observed in which the amount of chlorine exceeded 0.006 per cent. At Carlsruhe several wines have been examined in which the chlorine amounted to 0.03 per cent., representing 0.05 per cent. of common salt, or 25 per cent. of the entire ash.

IV. *Detection of Free Tartaric Acid in Wine.*—If 100 cc. of wine be evaporated to a thin syrup, and this, while kept stirred, be treated with strong alcohol until a fresh addition of spirit no longer causes precipitation, all the tartar will separate within two hours and the alcoholic solution will contain the free tartaric acid. The alcohol is

evaporated, the residue taken up with water, the somewhat turbid liquid cleared by the addition of pure washed animal charcoal,<sup>1</sup> filtered, and the filtrate, which may amount in volume to one-tenth of the original wine, treated cold with 1.5 to 2 cc. of a 20 per cent. solution of acetate of lime. A wine, which tested according to Berthelot and Fleurieu's method is found to contain no free tartaric acid, does not show the slightest turbidity when treated in the above manner. Wines containing 0.05 per cent. of free tartaric acid show after a short time a crystalline separation, and after half an hour a distinctly crystalline granular deposit on the sides and bottom of the containing vessel; in two hours the separation is considerable, after which it does not perceptibly increase. An amount equal to 0.01 per cent. gave in two hours distinct crystals of tartrate of lime. The presence, however, of so small a quantity of free tartaric acid is of little consequence in judging a wine. Wines from unripe or partially unripe grapes contain free tartaric acid; but according to the results of experiments on wines from most diverse districts it never exceeds one-sixth of the non-volatile acids present.

V. *Estimation of Citric Acid in Wine.*—Citric acid is sometimes used as an addition to the acid in an excessively diluted wine, either in substance, or, if it be desired to give to the beverage at the same time body and the appearance of old wine, in the form of tamarinds, in which it is present in considerable quantity. The estimation of citric acid in wine has, therefore, considerable interest.

For the detection of citric acid the characteristic behavior of its lime salt can be used, it separating in a crystalline form upon prolonged boiling of the aqueous solution; but the citric acid must previously be separated as much as possible from other acids and the special extract constituents of the wine, since citrate of lime remains dissolved in the neutral saline solutions of most acids. After many unsuccessful experiments the following method was found to give useful results.

100 cc. of wine being evaporated to about 7 cc., it is allowed to cool and then treated with 80 per cent. alcohol; after standing about an hour the undissolved matter is removed by filtration, the alcohol evaporated off, water added to bring the residue up to 20 cc., part of the acid neutralized with a thinnish milk of lime (red wine requires

<sup>1</sup> The charcoal must be boiled with hydrochloric acid and washed, so that whilst moist it shall have a perfectly neutral reaction, and contain scarcely any salts, especially phosphate.

here an addition of some washed animal charcoal), and then filtered. The filtrate, which must still be distinctly acid, is brought up to the original volume of the wine with water, and 0.5 to 1 cc. of a cold saturated solution of neutral acetate of lead added and very briskly agitated. The lead precipitate contains a portion of the malic acid (another portion remains dissolved as an acid salt in the dilute acid liquid), phosphoric acid, a trace of sulphuric acid, tartaric acid and citric acid. It is filtered off, washed with cold water, placed together with the filter in a closed retort containing water saturated with sulphuretted hydrogen and energetically shaken and thus decomposed. After standing some time the perfectly colorless, clear liquid, which contains the above-mentioned acids, is filtered off, washed with water containing sulphuretted hydrogen, the sulphuretted hydrogen driven off by evaporation, and the liquid, amounting to about 15 cc., made faintly alkaline with thin milk of lime, so as to separate phosphoric acid, then filtered, the filtrate acidulated with the smallest possible quantity of acetic acid, and by standing from half to one hour the tartaric acid present sufficiently removed as tartrate of lime. The liquid is then evaporated to dryness to separate free acetic acid, the residue taken up with hot water, and this concentrated until the separation of the crystalline citrate of lime. After being once separated it is no longer soluble in hot water; it is filtered off, washed hot, dried and weighed. The salt has the composition  $(C_6H_5O_7)_2Ca_3 + 4H_2O$ . In this way, in a case where 20 mg. of citric acid had been added to a wine a precipitate corresponding to 13 mg. of citric acid was obtained.

In a specimen of commercial tamarinds 13.5 per cent. of citric acid was found.

Most of the natural wines tested were found to be free from citric acid. Some of them contained traces; as, for instance, a white Alsace wine of 1878, and a white Italian wine of 1880. But the amounts of citric acid in these wines only amounted to between 0.003 and 0.002 per cent.—*Phar. Jour and Trans.*, July 15, 1882; *Zeitsch. f. Anal. Chem.*, xxi, 43.

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**Glycerite of birch tar** has been successfully used in eczema by E. Johanson; it was prepared by mixing one part of birch tar with eight parts of glycerin, the latter previously diluted with one-fifth water.—*Phar. Zeit. Russl.*, No. 21.

## AMMONIACAL CITRATES.

By E. LANDRIN.

It is well known that many metallic oxides and citrates, insoluble in water, are soluble in the alkaline citrates, even in the presence of reagents, which under ordinary conditions precipitate these oxides. This phenomenon has been made the basis of a quantitative method for the determination of phosphoric acid. Some years ago, Spiller (*"Pharm. Journ.,"* 1858) carried on a series of investigations, in order to study the influence of citric acid in preventing the precipitation of the metallic oxides, and arrived at the general result that the neutral citrates possess the property of combining with other salts to form a class of compounds of the general formula  $M'_3C_6H_5O_7 + 3M'_2SO_4$ , in which sulphuric acid may be replaced by carbonic, chromic, or boracic acids. For instance, solutions of these compounds are not precipitated by barium nitrate until a slight excess of sodium sulphate is present. Lebaigue (1864), however, considers that these phenomena are due to an interchange between the acids and bases, which is stable only so long as the citrate liberated in the nascent state is soluble, and thus the peculiar characteristics of the acids and bases present become apparent when the nascent citrate has saturated the alkaline citrate, viz., when the precipitant is in excess of the alkaline citrate. Further, the insoluble citrates are dissolved in the alkaline citrate in definite proportions, and citric acid being tribasic can saturate not only three equivalents of the same, but also of different bases to form soluble salts.

In order to decide between these views, the author has taken up the question, and has arrived at results in accordance with those of Lebaigue, *i. e.*, citrates insoluble in water dissolve in alkaline citrates, with formation of double salts of the composition  $M_2M'C_6H_5O_7$ , in which M is an alkali-metal, and M' a metal belonging to some other class.

This result receives support from the following experiments: If barium carbonate is gradually added to citric acid saturated with ammonia until one equivalent of acid and baryta are present, a clear solution is obtained, from which, on cooling, normal barium citrate separates out. The supernatant liquid contains in solution a double ammonium barium citrate. Analogous phenomena were observed with the oxides of calcium, strontium, lead, and cadmium. Again, if aluminium hydroxide be dissolved in ammonium citrate, and the solution evaporated over sulphuric acid, white crystals of a double ammonium

aluminium citrate,  $3\text{C}_6\text{H}_5\text{O}_7(\text{NH}_4)_2\text{H} + [\text{C}_6\text{H}_5\text{O}_7(\text{NH}_4)_2]_3\text{Al}_2 + 6\text{H}_2\text{O}$ , will separate out. A similar iron salt was obtained, a solution of which gives no precipitate with succinic and benzoic acids, no coloration with potassium thiocyanate, and no precipitate but only a green coloration with potassium ferrocyanide. The author also prepared and analyzed analogous double citrates of ammonium and magnesium, manganese, nickel, cobalt, zinc, copper, and mercury, but was unable to obtain salts of antimony, bismuth, tin, or silver.—*Jour. Chem. Soc.*, June, 1882; from *Ann. Chim. Phys.* [5], xxv, 233.

### OCCURRENCE OF SUCCINIC ACID IN AN INCRUSTATION ON THE BARK OF "MORUS ALBA."

BY G. GOLDSCHMIDT.

The author had often observed on the stems of mulberry-trees, both young and old, the exudation of a liquid, which dried up to crystalline crusts, especially on the side exposed to the wind. This liquid, which has a saline taste, was found to consist of a solution of calcium succinate,  $\text{C}_4\text{H}_4\text{O}_6\text{Ca}$ , which, after several recrystallizations with the aid of animal charcoal, melted at  $180^\circ$ , and was converted by distillation into the anhydride melting at  $160^\circ$ . The liquid also contained a small quantity of calcium carbonate.

The occurrence of exudations on mulberry-trees was observed long ago by Klaproth, who regarded them as consisting of the calcium salt of an acid which he called "Maulbeerholzsäure," and similar observations were afterwards made by Landerer. Gmelin, "Handbook," Engl. Ed., 8, 109) suggests that the acid found by these chemists was nothing but succinic acid, a suggestion which is corroborated by the observations above mentioned.

The occurrence of succinic acid in the juices of a large number of herbs has long been noticed; but it has not hitherto been found in liquids exuding from trees; and this circumstance, together with the observation that on all parts of the bark where the exudation occurred, a brown humus-like substance was also found, induced the author to think that the succinic acid in this case might perhaps be, not a physiological secretion, but the product of a pathological process.

To throw light on this question, he submitted the humus-like substance to the examination of Professor Wiesner, who found it to consist of dried plasmodia and sporiferous receptacles of a myxomices,



most probably a species of *Aethalium*. The plasmodia of myxomicetes are, according to Reinke ("Studien über das Protoplasma"), very rich in mineral substance containing a large proportion of lime. Succinic acid was not found in them by Reinke. The occurrence of the succinic acid is perhaps due to a fermentation process, in consequence of which the malic acid occurring in the juices of the mulberry-tree (Gmelin, 10, 206) is converted into succinic acid, a metamorphosis, which, according to Fitz ("Ber.," 12, 481) takes place somewhat readily in schizomycetic fermentations, and may be represented by the equation:  $3C_4H_6O_5 = 2C_4H_6O_4 + C_2H_4O_2 + 2CO_2 + H_2O$ .—*Journ. Chem. Soc.*, June, 1882; from *Monatsch. Chem.*, iii, 136.

## GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

*Willow Galls*, from *Salix nigricans*, *Fries*, have been examined by Edwin Johanson. They were externally felt-like and spongy, bore at their upper end a cluster of stunted leaves, and had formed on the tender branches, which had thereby become stunted, and within the galls enlarged and sponge-like. The ethereal extract of the concentrated aqueous infusion was fat-like, non-crystalline, and contained only traces of tannin-like compound. The lead precipitate from the aqueous infusion contained tannin, giving a green-black precipitate with ferric chloride. The filtrate from the lead precipitate contained no sugar; but the corresponding liquids obtained from the branches and leaves gave reactions for sugar. The alcoholic tincture prepared from material previously exhausted by water indicated by its reactions the presence of bodies related to quercitrin and catechin. Compared with the branches and leaves, the galls had a very similar composition and contained only a somewhat larger quantity of tannin.—*Phar. Zeitsch. Russ.*, 1882, p. 455—463.

*Resin of Pine Cones*.—The cones of *Pinus Abies*, called *elata* in Greece, secrete during hot weather an oleoresin called *elatopyssa*, which congeals in mastich-like tears, and, according to Landerer, is popularly employed in the form of pills and decoction in coughs, bronchitis, and in diseases of the bladder. The cones with the tears are not unfrequently kept in rooms on account of their balsamic fragrance.—*Zeitschr. Oest. Ap. Ver.*, 1882, p. 170.

*Relation of Starch to Atropine in Belladonna Root*.—F. Buddel has

examined several lots of belladonna root by exhausting with very diluted sulphuric acid, adding baryta, and evaporating to a syrupy liquid; this was taken up with alcohol, again evaporated, dissolved in dilute sulphuric acid, agitated with petroleum benzin to remove fat, then rendered alkaline by ammonia and agitated with chloroform; the chloroform solution, when evaporated, left the atropine, and, after weighing, this was titrated with tenth-normal solution of Mayer's test:

1. Fresh belladonna root, free from starch, yielded .125 per cent. atropine, or .625 per cent. calculated for the dried root.

2. Fresh root, containing starch, yielded .2 per cent. of atropine, or 1 per cent. for dry root.

3. Root, free from starch, collected in 1878, yielded .29 per cent. atropine.

4. Root like preceding, collected 1879, yielded .15 per cent. alkaloid.

5. Very starchy root, collected 1879, yielded .41 per cent. atropine.

6. Non-starchy root, collected 1881, gave .143 per cent. atropine.

The author concludes that starchy belladonna roots contain more atropine than non starchy roots, and explains the difference between samples 1 and 5 by the latter having been on hand for over a year when analyzed. He is also inclined to regard the non-starchy roots as having been derived from young plants.—*Arch. d. Phar.*, June, 1882, pp. 414-416.

*Falsification of Arnica Flowers.*—Ch. Ménier has examined a commercial sample of what was offered as arnica flowers, and was found to consist altogether of the flowers of *Inula britannica*, *Lin.* When seen in bulk these flowers somewhat resemble those of arnica, but the two may be readily distinguished by the following characters:

<i>Arnica montana.</i>	<i>Inula britannica.</i>
Heads, large, single.	Heads smaller, 2 or 3 in a lax corymb.
Involucral scales 16 or 18, equal, imbricated in two rows, lanceolate, hairy.	Involucral scales equal, narrow, linear, long-pointed.
Receptacle finely alveolate, chaffy, Ligules orange-yellow, with 9 to 11 veins.	Receptacle flat, naked. Ligules yellow, 4-veined.
Anthers naked at base.	Anthers with two filiform appendages at the base.
Akenes brown, stiff hairy.	Akenes hairy.
Odor characteristic.	Odor, none, or very feeble.

This substitution appears to have been practiced for a long time, and

not unfrequently the flowers of the two plants may be found mixed.

*Inula dysenterica*, *Lin.*, which resembles the above species, is distinguished by its double pappus, the outer row being very short, coroniform, toothed, or split to the base, and by its slightly alveolate but otherwise naked receptacle.—*Jour. Phar. et Chim.*, June, 1882, pp. 611, 612.

*Test for Distinguishing Cotton-seed Oil from Olive Oil.* By M. Zecchini.—The author recommends for this purpose pure colorless nitric acid, free from nitrous products, and having a density of 1.40. Acid of this strength forms with pure olive oil at first sight a colorless or slightly straw-colored mixture, changing to light dove-grey with yellowish reflex, whereas with cotton-seed oil it forms at first a golden-yellow mixture, afterwards changing to a coffee-brown color so deep as to be almost black. To apply the test, the two liquids are mixed in a test-tube closed with a caoutchouc stopper, and shaken together briskly for about half a minute, the tube being then left to rest in a vertical position for five or six minutes. This method serves for the detection of 0.5 per cent. cotton-seed oil in olive oil. It is essential to use acid of the strength above mentioned, for weaker acid, *e. g.*, of sp. gr. 1.22 to 1.33, produces with cotton-seed oil only a light colored liquid, scarcely distinguishable from that formed with olive oil; while on the other hand strong acid having a sp. gr. of 1.40 and charged with nitrous products gives a dark color even with pure olive oil.—*Jour. Chem. Soc.*, June 1882, from *Gazzetta*, 1882, 61.

*Artificial Amber*, closely resembling the natural product, is made chiefly from colophony; it softens at a much lower temperature, and becomes at once opaque and gradually soft in alcohol. True amber melts between 285 and 287°C.; alcohol acts scarcely upon it, and fragments of it are united to larger pieces by moistening the surfaces with potassa and pressing them together.—*Polyt. Notizbl.*

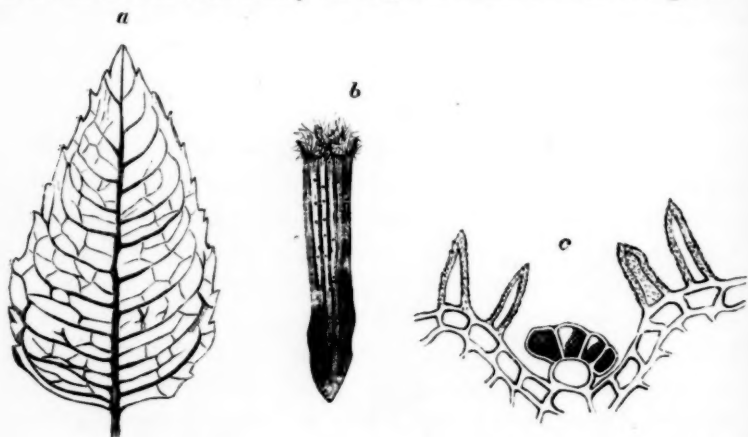
*Oil of Thyme* is conveniently tested for thymol, according to Hager, by spreading a half a drop of it, by means of a small cork, upon a glass slide, so as to occupy 4 or 5 square centimeters. The thymol begins to separate, within 3 or 4 minutes, in the central portion of this liquid, in numerous minute bodies, recognizable with the naked eye; subsequently they appear also towards the margin, but less numerous. Under the microscope they appear at first amorphous, but after an hour or two are easily recognized as crystals.

For the separation of thymol by means of caustic soda it is neces-

sary to distil the oil, collecting the fraction up to 220°C., and treating the residue with hot soda lye.

Or 2 volumes of the colorless oil are dissolved in 6 volumes of ether; add to this solution 1 volume of concentrated sulphuric acid, drop by drop, so as to avoid heating, agitate the mixture and set aside. It should rapidly separate into two equal layers, of which the upper one is but little colored, while the lower one is deep red. Should the oil contain little thymol, the mixture separates slowly, and the lower layer is mostly more than one-half, and instead of being red is merely pale yellow or reddish-yellow.—*Phar. Centralh.*, 1882, No. 27.

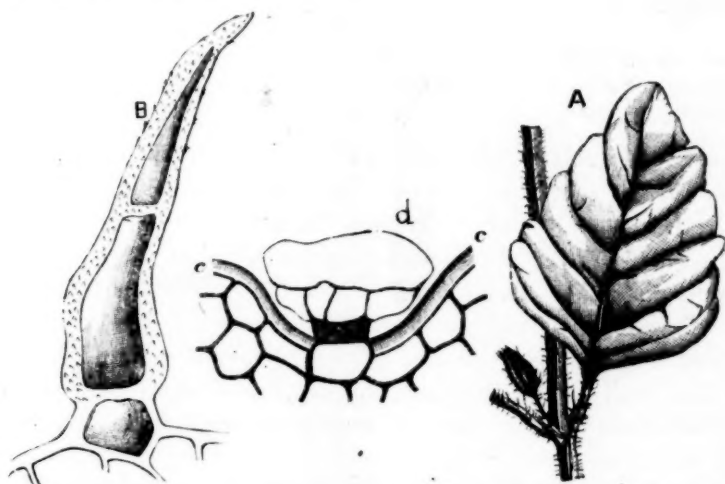
*Monarda fistulosa*, *Lin.*; *Wild Bergamot*.—The leaves have a prominent midrib and secondary nerves, the latter anastomosing near the



*Monarda fistulosa*, *Lin.* *a*, upper side of leaf, natural size. *b*, calyx, slightly magnified. *c*, epidermis from lower surface of leaf, magnified 160  $\times$ .

margin, are apparently smooth, but under the magnifying glass are seen to be hairy and densely punctate upon both surfaces. Under the microscope numerous small conical one-celled hairs, about .05 mm. long, are observed, occasionally with a somewhat longer several-celled hair; the hairs on the margin are 1 mm. long and many-celled; the glands are situated in depressions upon a broad stipe. The calyx is nearly 1 cm. long, tubular, many-ribbed, five-toothed, densely hairy on the margin, internally smooth, externally somewhat hairy and beset with yellow glands, which are visible under the magnifier. The mint-like odor becomes prominent on rubbing; the taste is pungently aromatic.—Dr. J. Moeller in *Ph. Centralhalle*, No. 29.

*Micromeria Douglasii*, Benth., known as *yerba buena*, a labiate plant of Northern California and Columbia, has been recommended as an anthelmintic, emmenagogue and febrifuge. The drug is described by Dr. J. Moeller as consisting of quadrangular hairy stems. The leaves are opposite, ovate, short-petiolate, obtuse, coarsely crenate, with the nerve branches running to the margin, and with sparse tertiary branches; the upper side almost smooth, the lower surface densely finely punctate, and on the nerves hairy; the largest leaves 4 cm. ( $1\frac{3}{8}$  inch) long and 3 cm. ( $1\frac{1}{8}$  inch) broad; the upper leaves smaller and more acute. The axillary pedicels are thin, about 7 mm. long; the calyx, mostly detached, is elliptic, 4 mm. long, 5 mm. broad, five-toothed, many-ribbed, hairy, internally naked, and contains at its base 4 nutlets. The drug has a slight aromatic odor, and an aromatic, somewhat bitter taste.



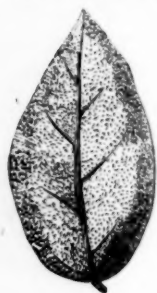
*Micromeria Douglasii*. a, leaf and calyx, natural size. b, simple hair, magnified 300 diam. c, cuticle, and d, gland, magnified 300 diam.

The cuticle on both surfaces of the leaves is firm. The hairs are firm, conical, mostly two-celled, and rest, with a broad base, upon the somewhat prominent parent cell. The glands are contained in concave depressions, are depressed, have a simple stipe cell, and contain a yellow secretion.—*Phar. Centralhalle*, 1882, No. 29.

*Eugenia Cheken*, *Molina*.—From Dr. J. Moeller's description of cheken leaves we take the following, supplementing that given on page 351 of this journal. The leaves are stiff, but not fragile, deli-



cately wrinkled, light green, occasionally yellowish, short-petiolate, somewhat revolute on the margin, pellucid-punctate, the venation observable on the lower surface, while on the upper surface only the midrib, and in the larger leaves also a few secondary nerves are seen; they are almost inodorous, but when rubbed are agreeably aromatic, and have an aromatic, afterwards strongly bitter taste.



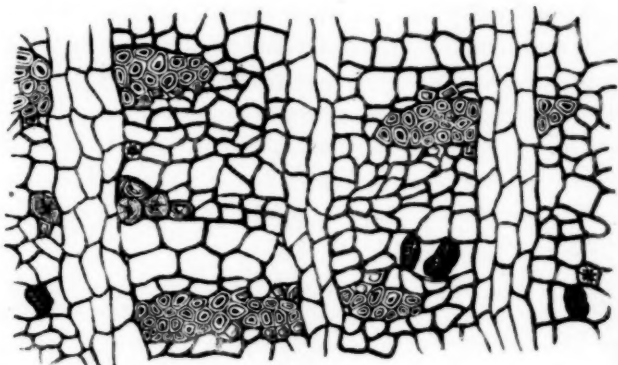
Cheken leaves, natural size.  
a, upper surface. b, lower surface.

The cuticle is particularly prominent upon the upper surface; the palisade cells form two rows, occupying scarcely one-third of the thickness of the leaf, and contain occasionally a group of crystals; the mesophyll consists of loose, irregularly branched parenchyma, and rarely contains crystals; the globular oil glands, with deep yellow contents, are scattered under the cuticle upon the upper and lower surface.

The virtues of cheken leaves reside in the tannin and volatile oil.—*Phar. Centralhalle*, 1882, No. 29.

The bark of *Rhamnus purshiana* has been examined microscopically by Dr. J. Moeller. The corky layer is about .045 mm. thick, and consist of 8 or 12 rows, somewhat flattened, rather thick-walled, but not sclerotic cells. The parenchyma of the primary bark is tangentially elongated, partly of a collenchymatic character, free from secondary cork, and contains scattered groups of roundish stone cells, with very thick walls, and accompanied by single rhombohedric crystals; the thin-walled parenchyma contains numerous groups of crystals. The inner bark consists of medullary rays composed of two or three rows of thin-walled, somewhat radially elongated cells, and of broader bast rays in which the parenchyma cells are coarsely dotted upon the radial and horizontal walls, and loosely united in a tangential direction; the sieve tubes are larger, irregularly angular, and united, to the number of 4 or 6, by means of coarsely porous sieve plates, and on the radial sides marked with roundish sieve fields; the bast fibres form alternate groups of two or three rows, extending into few bast rays, and are surrounded by crystal cells. The medullary parenchyma contains a crummy lemon-yellow substance, which dissolves in water with a yellow, and in cold potassa solution with a dingy red color. (See also "Am. Jour. Phar.," 1879, p. 165.)

Cascara sagrada is thicker and more fragile than frangula bark, and differs from the latter also in containing groups of stone cells in the primary bark, and a few such groups also in the bast layer.—*Phar. Centralhalle*, 1882, No. 28.



*Rhamnus purshiana*; transverse section through bast layer.

**Testing of Jalap Tubers.**—Hager states that the specific gravity of jalap resin is 1.15 to 1.16, and that of the sugar 1.5 to 1.6. Good jalap tubers, rich in these constituents, have a density of 1.15 to 1.18, and none should be accepted for medicinal use that have not at least the specific gravity 1.140, which is conveniently ascertained by means of a solution prepared from 200 grams dry table salt and 1,055 grams of water. At least 90 per cent. of the jalap tubers should sink in this liquid at a temperature of 15° to 17°C., care being taken to remove gas bubbles from the surface of those tubers which may float. The jalap is afterwards collected upon a sieve, rapidly washed with water and dried.—*Phar. Centralhalle*, 1882, No. 27.

**Moravian Rhubarb.**—The culture of *Rheum compactum* in Moravia was commenced, in the beginning of the present century, by Prikryl, apothecary in Austerlitz. Until about 25 or 30 years ago the root was largely exported to Lyons and Milano, where it was used for dyeing silk. With the use of chemicals for dyeing, the price of this rhubarb receded to about 10 florins per hundredweight, but more recently has advanced again, and is about 1 florin per pound for triennial roots. This rhubarb is again largely exported, chiefly to Russia, whence it is exported again as Asiatic rhubarb. Prof. Dr. A. Vogl has pointed out histological differences by which this article may be distinguished from Chinese rhubarb; but a correspondent insists

that even in this respect it will resemble the latter much more closely if permitted to remain in the ground for 5 or 6 years. The commercial article is said to yield extracts, tinctures and infusions which, not only in color, odor and taste, but likewise in activity, compare favorably with the corresponding preparations of Chinese rhubarb. The author urges the employment of this rhubarb, partly for patriotic reasons as far as Austria-Hungary is concerned, but chiefly on account of its low price and its good effects, these being fully secured if 5 parts of Moravian rhubarb be used in place of 4 parts of the Chinese root, as was pointed out already, in 1808, by Trommsdorff.—*Phar. Post*, June 16, 1882, p. 206—209.

### NOTES ON ALUMEN, B. P.

BY W. WATSON WILL.

Ammonio-aluminic sulphate manufacture seems to have become a thing of the past, and great difficulty is now experienced by pharmacists in obtaining it, the potassic salt having entirely taken its place. No doubt the consumption of alum from a pharmaceutical point of view is small in comparison to the enormous quantities used in the arts and manufactures of this country, but I think if there had been a persistent demand, however small, for ammonia alum, its manufacture would not have become obsolete. In a communication I had from Mr. R. King, of Glasgow, some time ago, he assured me there was no demand for ammonia alum, a statement fully endorsed by Mr. P. Spence, of Pendleton, in a note I had from him regarding this subject. Various have been the processes employed in the preparation of ammonia alum, some makers preparing the aluminum sulphate from aluminous schist or shale, others using clay or kaolin. The following is a brief *résumé* of one of the processes: Shale of coal measures, previously calcined, is placed in iron vessels lined with lead, and sulphuric acid from an adjoining receiver is poured over it; the mass then allowed to digest at a temperature of 240°F., this degree of temperature being sustained by a fire underneath the vessels and also by steam and ammonia vapor being blown into the pan. The solution, after evaporating for some time, is poured into large coolers and strongly agitated to prevent formation of large crystals. The deposit of fine crystals, commonly called "flour alum," is now washed and redissolved by steam, and the solution run off into large vessels, called "roaching

casks," to crystallize. After seven or ten days the staves of these "casks" are taken off, and a complete shape is left of crystallized alum. A few holes are made in the side of this mass, and the mother-liquors allowed to drain off; then it is broken and packed for sale. Other makers, instead of adding ammonia in a state of vapor, more generally used the chloride or sulphate made by neutralizing ammoniacal gas liquor with hydrochloric or sulphuric acid; the former of the two solutions was mostly used, on account of the amount of iron contained in the crude aluminum sulphate. Following the latter of the two processes just mentioned, I would suggest a short mode for the preparation of ammonio-aluminic sulphate, easy in manipulation, adaptable to small laboratories, and satisfactory in result. Take of aluminum sulphate (cake alum) 14 pounds, ammonium sulphate  $3\frac{1}{2}$  pounds, warm water 4 gallons; dissolve the ammonium sulphate in half a gallon of water and the aluminum sulphate in the remainder, filter the solution to free it from the finely divided silica, and to the filtered liquid add the ammonia solution; then apply heat until the solution boils, pour off into a suitable vessel to crystallize. After a few days draw off the mother-liquor; then drain the crystals on a loosely stopped funnel. One hundred grains of ammonia aluminic sulphate made by this process, on being incinerated, left a residue which on cooling weighed 54 grains, corresponding to the requirements of the Pharmacopœia.—*Phar. Jour. and Trans.*, July 8, 1882.

## PRACTICAL NOTES FROM VARIOUS SOURCES.

BY THE EDITOR.

*Carbolic acid liniment*, prepared by dissolving carbolic acid 1 part in olive oil 100 parts, is recommended for the cure of itch, for which purpose two applications are said to be sufficient.—*Zeits. f. Diagn.*, i, p. 80.

*Preparation of Crystallized Hyoscyamine*.—Duquesnel recommends the following process: Displace 2,000 parts of powdered hyoscyamus seed with boiling 90 per cent. alcohol, containing 1 part of tartaric acid; distil the tincture; decant the green oil, weighing about one-third of the seed, from the syrupy layer, and agitate the former with dilute sulphuric acid. The acid solution is nearly neutralized with potassium bicarbonate, filtered and evaporated in a water-bath. Cool the syrupy residue, exhaust it with alcohol which leaves potassium

sulphate undissolved, distil off the alcohol and evaporate it completely in a water-bath; dissolve in very little water, add potassium bicarbonate in slight excess, agitate with chloroform, filter this solution and treat it with dilute sulphuric acid slightly in excess; decolorize the solution of sulphate with purified animal charcoal, evaporate at a moderate heat to a syrupy consistence, mix with precipitated calcium carbonate, afterwards with fine sand, and dry the mixture over sulphuric acid or burned lime; exhaust the powder with chloroform, distil and finally evaporate spontaneously after the addition of a little rectified toluene.

Thus prepared, the alkaloid is in long prismatic needles, colorless, inodorous, soluble, with a strong alkaline reaction, in water, readily soluble in alcohol, ether and chloroform, and, like atropine, yields a violet color when heated with nitric acid and treating the dry residue with alcoholic solution of potassa. With sulphuric acid and potassium bichromate it evolves an agreeable odor somewhat resembling that of bitter almond. The sulphate is a neutral salt and little deliquescent.—*Jour. Phar. Chim.*, Feb., 1822, pp. 131—138.

## SOME REMARKS UPON MODERN PHARMACEUTICAL STUDY.

BY H. J. MÖLLER.

(Continued from page 421.)

### ITALY.

The following facts respecting pharmaceutical education in Italy I have obtained from Mr. Kernwein, "chimico-farmacista" in Florence, to which gentleman my friend Mr. Arthur Meyer (at present an assistant at the pharmaceutical institute in Strassburg) had the kindness to introduce me.

The most recent law, regulating pharmaceutical study, is the royal decree of March 12, 1876. The course is arranged in a quite peculiar way which very much resembles the system employed in Spain and Greece.

There are two classes of pharmacists, viz.: "farmacista" and "laureato" (or "dottore") in chimica e farmacia," and also assistants (called "ministro," "giovane" or "commesso"); these last do not correspond to the German "Gehülfe," but are always examined pharmacists, *i. e.*, have all passed the "Major."

The young man who wishes to commence the study of pharmacy, must first prove that he is qualified to enter the third class of the "liceo," or he

<sup>1</sup>The "liceo" is the classical school; the third class is the highest, and the final examination of this class is called the "licenza liceale," and thus corresponds to the German "Maturitätsprüfung," and the French "baccalauréat."



must have passed the three first classes in an "istituto tecnico;" (this school corresponds to the German "höhere Realschule;") in the last case he must pass a special examination in Latin.

If these demands are fulfilled, the young man does not begin his *practical* education, but commences immediately to follow the lectures at the universities, where, according to Article 2 of the above-mentioned law, special pharmaceutical schools are to be established. Such a "scuola di farmacia" already exists in Florence, where it is connected with the "scuola di medicina." The course occupies from four to five years, according to the two following plans.

A. Plan of study, requisite for the degree of "*farmacista*."

First year: inorganic chemistry, botany, mineralogy, physics.—Second year: Organic chemistry, botany, pharmaceutical and toxicological chemistry, materia medica; practical exercises in pharmaceutical chemistry, toxicology and qualitative analysis.—Third year: Continuation and termination of the same studies and exercises as in the second year.

At the end of every year examinations are held in the completed branches. After the last of these examinations, the student goes to a pharmacy of a hospital, to a military or other pharmacy, which is authorized by the government to this end, and there first he commences his practical education which is finished in one year. This last, fourth year of study is called the "*anno di pratica*," and is terminated by a final examination, which includes qualitative analysis, a chemical and a "*galenical*" preparation, medical botany, materia medica, and the dispensing of prescriptions.

B. Plan of study requisite for the degree of "*dottore* (or "*laureato*") in *chimica e farmacia*." The studies extend over five years, and are divided into two periods.

1. The first period (three years): Inorganic and organic chemistry, physics, pharmaceutical and toxicological chemistry, botany, mineralogy, geology, zoology, materia medica and toxicology.—Practical exercises in: Physics, botany, mineralogy, materia medica, qualitative analysis and chemical preparations.

2. The second period (two years): In the fourth year the candidate studies more especially qualitative, toxicological and zoochemical analyses; he must also make some separate studies in a special branch of natural science, chosen by himself. In the fifth year ("*anno di pratica*") he learns practical pharmacy as above-mentioned. Now he passes the final examination which consists of three parts; the first includes qualitative, quantitative and toxicological analyses and an oral examination in these branches; the second part embraces two chemico-pharmaceutical preparations, medical botany and materia medica; the third consists of a dissertation on a theme, chosen by the candidate himself, and a discussion of this dissertation. It is required of the candidate, who wishes to be a "*dottore*" in pharmacy that he shall have passed the above-mentioned "*licenza liceale*."

GREECE.

The pharmaceutical course in Greece resembles that of Italy in many respects. The following communications I have obtained through a correspondence with Professor Xavier Landerer of Athens, who formerly was

pharmacist to the king, and from 1835 to 1868 was a teacher of the Greek pharmaceutical students.

In the year 1837 the university in Athens and the pharmaceutical school therewith connected were established, and from 1837 to 1868 it was required that the student should have reached the third class<sup>1</sup> of the classical school. Then he was two years in a pharmacy as an apprentice and afterwards he studied at the university for two years more, following the lectures at the pharmaceutical school in chemistry, pharmacy, *materia medica*, toxicology, botany and physics. After this he served as an assistant for at least a year, and then passed a final and practical examination.

These rules were changed in the year 1868. The above-mentioned "absolutorial" examination is now required before entrance upon the study of pharmacy, and the student commences immediately to follow the lectures at the university, without any foregoing practical education. Having studied for three years at the university, he spends a year in a pharmacy and then passes the "Major." This is quite the same as that demanded of the Italian "farmacista," and I will, therefore, not tire the reader with a repetition of the whole plan of study, but will refer him to the plan A,\* given in my remarks on Italy.

Professor X. Landerer, who is himself a German, says in one of his letters to me that he considers the present standard of Greek pharmaceutical examinations to be quite as high as that of the corresponding ones in Germany.

#### BELGIUM.

The pharmacy of this country has, as so many other things in Belgium a French form. On a journey in the spring of 1880, I had opportunity to notice this myself, and to collect a part of the following notes which I have made more complete through a correspondence with Professor A. Herlant, teacher in *materia medica* at the pharmaceutical institute in Brussels.

In Belgium pharmaceutical study is made at four special pharmaceutical institutes, which are connected with the four Belgian universities in Brussels, Ghent, Louvain and Liège.

According to the "règlement organique pour la collation des grades académiques de l'université libre de Bruxelles," which I obtained at the questorship of the University of Brussels, the requirements at the pharmaceutical examinations are fixed by Articles 16 and 17 of the law of May 20, 1876, as follows :

A. The "candidature<sup>2</sup> en pharmacie" requires only an examination, which embraces the elements of physics, general chemistry, general and medical botany, mineralogy and geology, and also a practical test in chemistry.

B. The degree of "pharmacien" (*i. e.*, the "Major") requires also one examination, but this may be divided in two successive parts if the candi-

<sup>1</sup>The third class is the highest, but the final examination of this class (the so-called "absolutorial" examination) was not formerly demanded. This "absolutorial" examination corresponds thus to the German "Maturitätsprüfung," and the French "baccalauréat."

<sup>2</sup>This degree gives the possessor the right to be an assistant only, and thus corresponds to the German "Gehülfe."

date prefers. The first part embraces the elements of analytical and toxicological chemistry, drugs, posology and theoretical and practical pharmacy. The second part includes: (1) Two chemical preparations; (2) Two "galenical" preparations; (3) A qualitative analysis; (4) A toxicological research (under this also quantitative analysis); (5) An analysis of a remedy and the determination of possible adulteration (by means of chemical and microscopical research); (6) An especial microscopical analysis (of a mixture of different sorts of flour, powder, etc., or of the micrographic characters of a drug.

After the apprenticeship in a pharmacy the young man studies two years at the pharmaceutical institutes before he passes the examination for the "candidature en pharmacie," and then two years more before the examination for the title of "pharmacien." In the first two years the students are matriculated at the "faculté des sciences," in the last two years at the "faculté de médecine." The pharmaceutical study at the university thus lasts in all four years; in the last two years the students are instructed in applied micrography. When the diploma as "pharmacien" is obtained, the successful candidate may establish himself when and where he will. By this short communication one can see that pharmaceutical study in Belgium is very well arranged.

#### FRANCE.

My notes on the study of pharmacy in France I have myself collected from different journals, programmes, collections of laws, in the Bibliothèque Nationale here in Paris. I am highly indebted to Professor Planchon for the kindness with which he has given me all further information that I desired.

France is the country possessing the largest number of special schools of pharmacy, and pharmaceutical study is here so highly developed that, so far as I can see, only Germany can compete with it.

The most famous school of pharmacy in France is the *Ecole supérieure de pharmacie de Paris*. The present school is situated in the Rue de l'Arbalète, in the old Quartier Latin, and was founded as early as the sixteenth century by the pharmacist Nicolaus Houël, but was at first a very unimportant institution. In 1777 the school was much improved and obtained fixed professors. At length Napoleon Bonaparte issued the law of Germinal 21, of the year XI (*i. e.*, April, 11, 1803), which ordered the establishment of three large écoles supérieures de pharmacie in Paris, Strassburg,<sup>1</sup> and Montpellier. Later, Louis Phillippe issued an "Ordonnance du Roi du Septembre 27, 1840," which connected the pharmaceutical schools with the universities, and gave them the same rights as the other departments of the universities (for example: *Ecole de médecine*, *Ecole de droit*, etc.).

The above-mentioned "*Ecole supérieure de pharmacie de Paris*," in the Rue de l'Arbalète, is no longer sufficient for the present requirements of

<sup>1</sup>After the war 1870-71, this school was transferred to Nancy. The old French pharmaceutical school in Strassburg is the same which now, under the direction of Professor Flückiger, has the title: "*Das pharmaceutische Institut der Universität zu Strassburg*."

the science and for the great number of students.<sup>1</sup> A fine new building has therefore been erected on ground which formerly was a part of the Jardin du Luxembourg. This new school, on the corner of the Avenue de l'Observatoire and Rue Michelet, is by far the largest pharmaceutical institute in the world, and will cost between four and five millions of francs. The two amphitheatres, where the lectures are to be held, can each contain five hundred auditors, and the large building, where the laboratories are collected in three stories, is about 250 paces long; all the other parts of the school being in proportion to these rooms, it is easy to get an idea of the large scale on which this school is built. A small part of the new school is already used, but the whole institute will not be finished before the spring 1881.

Besides these three "Ecoles supérieures de pharmacie" in Paris, Montpellier and Nancy, France has also three so-called "Facultés mixtes de médecine et de pharmacie" in Lille, Lyons and Bordeaux. These six schools are higher than the preparatory pharmaceutical schools ("les écoles préparatoires de médecine et de pharmacie"), which are again divided into "Ecoles de plein exercice de médecine et de pharmacie" (in Marseille and Nantes) and "Ecoles préparatoires secondaires." At the present time one of the last-mentioned schools is found in each of the following sixteen cities: Alger, Amiens, Angers, Arras, Besançon, Caen, Clermont, Dijon, Grenoble, Limoges, Poitiers, Reims, Rennes, Rouen, Toulouse and Tours.

There are two classes of pharmacists in France, but according to a decree of August 31, 1878, there is no other difference between the education of "les pharmaciens de première classe" and "les pharmaciens de seconde classe," than that the first must be "bacheliers," i. e., have passed the whole classical school, while the second need only to have passed "la classe de quatrième."<sup>2</sup> There is in addition a higher diploma for the pharmacists of the first class. This diploma is called "le diplôme supérieur de pharmacien de première classe," and gives the right to compete for the professorships in the pharmaceutical sciences at the "Facultés mixtes de médecine et de pharmacie."

According to the "décret<sup>3</sup> du 12 Juillet, 1878, relatif aux conditions à remplir pour obtenir le diplôme de pharmacien de première classe," which, as above mentioned, is now also applicable to the pharmacists of the second

<sup>1</sup>There are now nearly six hundred pharmaceutical students at the Paris school.

<sup>2</sup>According to the "décret" and the "arrête" of June 19, 1880, and the "arrête" of August 2, 1880, the French classical schools ["les lycées"] consist of the following classes:—

*Division élémentaire:* (1) Classe préparatoire; (2) Classe de huitième [the lowest age of the scholar is nine years]; (3) Classe de septième [ten years].

*Division de grammaire:* (4) Classe de sixième [eleven years. Here the pupil commences to learn Latin, ten hours a week]; (5) Classe de cinquième [twelve years; ten hours of Latin a week]; (6) Classe de quatrième [thirteen years; six hours of Latin and six hours of Greek a week. It is the final examination of this class which is demanded in order to be a pharmacist of the second class].

*Division supérieure:* (7) Classe de troisième [fourteen years]; (8) Classe de seconde [fifteen years]; (9) Classe de rhétorique, Classe de philosophie [sixteen years].

It is the final examination of this last class which is demanded in order to be a pharmacist of the first class, and it gives the right to the titles of respectively "bachelier ès lettres" or "bachelier ès sciences."

<sup>3</sup>As published in Journal Officiel, July 20, 1878.

class, the candidate must prove that he has passed the required examinations in the classical school. Then he must stay three years in a pharmacy before he passes his first pharmaceutical examination ("un examen de validation destage"), which corresponds to the German "Gehülfenprüfung."

- This examination is ordered by a decree<sup>1</sup> of December 30, 1878, and is held at the pharmaceutical schools by a professor and two pharmacists of the first class; it embraces (1) a "galenical" or chemical preparation according to the pharmacopœia; (2) the preparation of a remedy after a prescription; (3) the determination of ten compound remedies and of thirty plants or parts of plants, belonging to the materia medica, and (4) the answering of questions upon different pharmaceutical operations.

Now the student leaves the pharmacy and spends three years in a school of pharmacy; if he intends to be a pharmacist of the first-class, he is obliged to pursue his studies at one of the six higher pharmaceutical schools. At the end of each year he passes an examination; the first includes: physics, chemistry, toxicology, and pharmacy; the second embraces: botany, zoology, materia medica, hydrology, and mineralogy; the third consists of pharmaceutical and chemical preparations. At the first examination the candidate must make a chemical analysis, and at the second a microscopical preparation. At the third examination he is given four days to make the required preparations under the survey of a professor; the oral test at this last examination is held in two sittings.

"Le diplôme supérieur de pharmacien de première classe" can be given to the pharmacists of the first class after the defence of a thesis and some new and very severe examinations.

Pharmaceutical study in France, at least in the six higher schools and especially in the Parisian school, must be regarded as having attained as high a state of development as any in Europe. I shall not here tire the reader with a complete review of these studies, but only refer to the programmes<sup>2</sup> of the respective schools.

Here I shall end these short remarks on the present state of pharmaceutical study. It is not for me to make the application of these notes to English pharmacy, since I know too little of its needs. My desire has been only to give a short report of what I have seen and learned of the important educational foundation of our profession. I could have wished to make these communications at least as complete as in the original Danish edition, but a journal is not the right place for such more comprehensive researches, and therefore, I must beg my colleagues to receive my notes as they now lie before them, and I shall be very happy if, in this abbreviated form, their interest have been preserved.

<sup>1</sup>Journal Officiel, January 7, 1879.

<sup>2</sup>For example: "Programmes des cours de l'Ecole supérieure de pharmacie de Paris, premier et second semestre." "Programmes des cours complémentaires de la même école." The publisher is Dunod, Quai des Augustins, No. 49, Paris. The price is one franc and fifty centimes for all the three programmes.



## VARIETIES.

**BORAX IN CALIFORNIA.**—Borax is now well known to occur in very many of the salt-springs in the Coast Mountains of California. But in only two places has it been found in large quantities: these are Borax Lake and Hachinhama (pronounced *Hah'-chin-ha'-ma*), both being in the immediate vicinity of Clear Lake, about eighty miles north of San Francisco.

Borax Lake is a shallow pool intensely of alkaline water, without inlet or outlet, and of course its extent depends on its reception of rain water. After an exceptionally wet season it has a length of perhaps a mile and a half, with a depth of eight to ten feet; after an exceptionally dry season, on the contrary, it shows sometimes no water, the muddy bottom being covered with saline incrustations. When it has a length of three-fourths of a mile, with a depth of four feet, being perhaps its average condition, the water holds in solution 18·75 grains of solid matter to the ounce—·039 of its own weight. This consists of salts of soda, in the following proportions: Sodium carbonate, ·618; sodium chloride, ·204; sodium biborate, ·178.

But this alkaline water, exceedingly rich as it is in borax, constitutes only a trifling part of the commercial value of the lake. In fact, it has never been turned to account at all in the manufacture of borax, though such use of it is entirely practicable, as the statements to be presently made in relation to Hachinhama will show. The muddy bottom of the lake was found, immediately on its discovery in 1856, to contain borax in crystals, in quantities most astonishing.

These crystals, being tested by various workers in iron and steel, were pronounced equal to the very best of refined borax. They are, in fact, pure biborate of soda, without any other impurities than the mud mechanically entangled with them in their process of crystallization. They correspond to the native borax of other localities, designated as *tincal*, but yet are decidedly distinct from it. In fact, no such crystals as those of Borax Lake have ever been found in any other locality, and there are several points in connection with their mode of formation, and even their very existence, which are by no means easy of comprehension.—Dr. W. O. Ayres, in *Popular Science Monthly* for July.

**USE OF GEUM ALBUM.**—Dr. W. A. Spurgeon, in "Therapeutic Gazette," March, 1882, says that this plant, is already useful as an anti-emetic; that it relieves gastric irritation (from any cause) and headache. A teaspoonful of a tincture, representing eight troyounces to the pint, is a dose, but larger doses may be given.—*Virginia Medical Monthly*, August, 1882.

**AGARICUS** is much used in France as a remedy for night sweats, and Dr. R. V. Wolfenden has found it of great value. It is given in doses of twenty grains, prescribed in a confection. It may at times cause diarrhoea which is easily prevented by combining it with a little opium.—*Medical Times and Gazette*.

NITRO-GLYCERIN has lately been experimented with in doses of  $\frac{1}{100}$  to  $\frac{1}{50}$  of a grain and endorsed by Dr. Wm. Murrell of the Royal Hospital for Diseases of the Chest, London. He has found it useful in affording relief in angina pectoris, as well as in neuralgias in other portions of the body. Dr. Murrell began its use in doses of 1 drop of a 3 per cent. solution every four hours, gradually increasing until the patient had taken as much as 8 drops every four hours. The drug is now prepared in the form of sugar and gelatin coated pills, containing the one-hundredth of a grain each; of these one or two may be taken as occasion may require.—Dr. A. Atkinson, *Transactions Maryland Medical Society.*

THE EFFECTS OF OIL OF TANSY.—Dr. G. Jewett ("Boston Med. and Surg. Jour.") reports eight cases of poisoning with this drug. Case 1: Fifteen drops at 11 A.M., teaspoonful at 2 P.M.: convulsions, shock, general cyanosis; recovery. Case 2: Teaspoonful to promote catamenia: convulsions and death in one hour and a half. Case 3: Unknown quantity to cause abortion: convulsions; death in three hours and a quarter; no abortion. Case 4: Teaspoonful to cause abortion; coma, recovery; no abortion. Case 5: Four drams; spasms and death. Case 6: To cause abortion; rapid death; no abortion. Case 7: Decoction of tansy-leaves to produce abortion; paralysis; coma; death in twenty-four hours without abortion. Case 8: Infusion of leaves daily for a week; also for vaginal injection; abortion, metritis, peritonitis; recovery after three months. As druggists are often asked for oil of tansy under various pretenses we believe the above table will be useful in reminding them of the dangers attending the sale of tansy and its preparations.—*Louisville Med. News.*

HYPODERMIC INJECTIONS OF CAFFEINE.—The "Lancet" says that owing to its very slight solubility in water, caffeine has not hitherto been used hypodermically. M. Tanret has discovered that caffeine dissolves readily in solutions of benzoate, cinnamate and salicylate of soda, the double salts being thus formed. Salicylic acid yields the salt most soluble in water. M. Dujardin-Beaumetz has employed these solutions hypodermically, and has ascertained that they do not irritate. Solutions for administration by the mouth may also be readily obtained in this manner. *Med. and Surg. Rep.*, August, 12.

## PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE IOWA COLLEGE OF PHARMACY is a new institution, located at Des Moines, and commencing its first course of lectures October 10th. The faculty consists of T. E. Pope, A. M., Professor of Chemistry; W. W. Hale, LL.B., M. D., Professor of Materia Medica and Toxicology; Emil L. Boerner, Ph. G., Professor of Pharmacy; and Robert McNutt, A. M., M. D., Professor of Botany. The aim of the institution, according to the "Announcement" before us, is that "the incorporators of this school, having long recognized the need of such an institution in this section, have deter-

mined to establish such an one in Des Moines as will enable graduates to meet these requirements" (*i. e.*, of the Iowa Pharmacy Law).

THE WISCONSIN PHARMACEUTICAL ASSOCIATION held its third annual meeting at Oshkosh, August 8th to 10th, President F. Robinson in the chair; E. B. Heimstreet, Secretary. Reports were received from the President, Permanent Secretary, Executive Committee, Committee on Drug Market and the Board of Pharmacy, the latter stating the total registrations under the new pharmacy law to be 1,088, of which number 902 are registered pharmacists, 6 minor and 180 assistant pharmacists; 46 were graduates and 31 licentiates; 30 applicants were rejected. Professor J. M. Maisch, of Philadelphia, and Dr. C. Smith, of Evansville, were elected honorary members.

A paper on Powdered Drugs, by E. B. Stuart, was read, and ordered to be published, and greetings were exchanged by telegraph with the North Carolina Pharmaceutical Association, in session at Winston. Resolutions were passed favoring the organization of a school of pharmacy in connection with the State University, and in opposition to the use and sale of all secret medicines, such as proprietary and trade-mark compounds.

The officers elected for the current year are, President, George Bauman, of Oshkosh. Vice-Presidents—R. D. Pulford, of Mineral Point; T. J. Hooper, of Platteville. Secretary, E. B. Heimstreet, of Janesville. Local Secretary, T. H. Spence, of La Crosse. Treasurer, W. P. Clarke, of Milton. After the appointment of the Standing and Special Committees the Association adjourned, to meet again at La Crosse on the second Tuesday of August, 1883.

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## EDITORIAL DEPARTMENT.

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CHARGES AGAINST PHARMACISTS.—The dearth of news incidental to the dog-days has caused the "Philadelphia Press," a daily newspaper, to enliven its columns with onslaughts upon the integrity of the pharmacists of this city, and to attract attention thereto by sensational headings, such as "Tricky Druggists," "The substitution of a cheap article for a more expensive one a common practice with some apothecaries," "Common Adulterations by some Apothecaries," and others of a similar nature. These will explain the compass of the charges brought forward, namely, adulteration and substitution. As might have been expected, certain physicians rushed into print, regardless of the consequences; several who had figured in similar crusades in previous years were tempted to a renewal of hostilities; others, more or less obscure, embraced the opportunity of being publicly styled "prominent." The few really prominent physicians who responded to the interviewing reporter had experienced no difficulty in procuring drugs of good quality, and in having their prescriptions accurately compounded. The charges, as heretofore, were based on failure in the expected activity, on low price, on incorrect color, and in one case the microscope was guilty of revealing to an M.D. that his sugar-coated 2-grain quinine pills contained only one-quarter of a grain of this valuable anti-malarial agent.

We should not have taken any notice whatever of this attack if the charges had not found their way into many periodicals published in various parts of the country. To the intelligent physician and pharmacist they need no refutation, since they bear the stamp of absurdity. Our readers are aware that this journal has always denounced corrupt practices in the preparation and dispensing of medicines; but during a long service in the pharmaceutical ranks we have found integrity and conscientiousness to be the rule, and want of probity to be the exception, the same as in other professions and trades. The abortionist is a despicable individual, but his vile practices do not cast a stain upon the escutcheon of medicine. In an identical relation towards pharmacy is he who adulterates and substitutes as charged above. The Trade Association of Philadelphia Druggists has taken a sound position in this matter: a committee appointed by it has asked for the proofs of the charges made, and offered to prosecute, under the adulteration clause of the Philadelphia Pharmacy law, any one against whom such proof may be furnished. As far as we are aware, neither names nor evidences have been forthcoming.

At a later stage of these tirades against pharmacists, the "Press" has seen fit to pour oil upon the troubled waters, and to prepare the following healing balm for the wounded:

The revelations do not strike at the whole retail drug trade. The swindlers are in a small minority, but there are enough of them to make it worth while to lay their practices bare. And happily there are so many druggists of established reputation and unquestioned integrity that the customer may have a wide range of choice and still be within the bounds of safety.

A Western paper, commenting on the above charges, very properly states that there is no safeguard against such alleged defraudations except the integrity of the apothecary.

**CHEMICAL NOMENCLATURE.**—It is unnecessary for us to point out the advantages which would result if a uniform nomenclature would be adopted by writers on chemical subjects. The Pharmacopœia of 1870 had made a few changes, which have in most cases met with general approval. Several additional changes will be found in the new Pharmacopœia now in course of publication, and will doubtless lead towards greater uniformity in the nomenclature of pharmaceutical literature. Improvements in this respect might, perhaps, have been pushed still farther; at any rate we think that our readers will recognize in the following plan a comprehensive effort at systematizing the nomenclature of chemical compounds. This plan was elaborated by the British Chemical Society in 1879, and was recently republished, with several slight modifications, with the view of promoting uniformity of nomenclature and notation in papers communicated to the Society. We omit the instructions relating to the notation, which refer mainly to graphic formulas.

1. Employ names such as *sodium chloride*, *potassium sulphate*, *ethyl acetate*, and use the terminals *ous* and *ic* only in distinguishing compounds of different orders derived from the same elementary radicles, *e. g.*, mercurous and mercuric chloride, sulphurous and sulphuric acid.

2. Term compounds of metallic and alcoholic radicles with (OH), *hydroxides* and not hydrates, *e. g.*, potassium hydroxide, phenyl hydroxide, the name hydrate being



reserved for compounds supposed to contain water of combination or crystallization. Compounds such as  $\text{CH}_3\text{ONa}$ ,  $\text{C}_2\text{H}_5\text{ONa}$ ,  $\text{C}_7\text{H}_{15}\text{ONa}$ , etc., should be termed sodium methoxide, ethoxide, heptyoxide, etc.

3. Apply the term *acid* only to compounds of hydrogen with negative radicles, such as  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{H}_3\text{PO}_4$ , and denote the oxides which form acids by names such as sulphuric anhydride or sulphur trioxide. Term salts containing an amount of metal equivalent to the displaceable hydrogen of the acid, *normal* and not neutral salts, and assign names such as hydrogen-sodium sulphate, hydrogen-disodium phosphate, etc., to the acid salts. Basic salts are as a rule best designated merely by their formula.

4. Use names such as *methane*, *ethane*, etc., for the normal paraffins or hydrocarbons of the  $\text{C}_n\text{H}_{2n+2}$  series of the form  $\text{CH}_3(\text{CH}_2)_n\text{CH}_3$ . The isomeric hydrocarbons are usually most conveniently represented by names indicating their relation to methane; for example,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$  = propylmethane;  $\text{CH}_3\text{CH}(\text{CH}_3)_2$  = isopropylmethane; or, although less frequently, by names such as diisopropyl.

5. Term the hydrocarbons  $\text{C}_2\text{H}_4$  and  $\text{C}_2\text{H}_2$  *ethylene* and *acetylene* respectively (not ethene and ethine. Distinguish the homologues of ethylene, whenever possible, by names indicating their relation to it, such as methylethylene, dimethylethylene, etc., denoting the di-derivatives of the form  $\text{C}_n\text{H}_{2n+1}\text{HC:CHC}_n\text{H}_{2n+2}$  as  $\alpha$ -, and those of the form  $\text{CH}_2\text{C}(\text{C}_n\text{H}_{2n+1})_2$  as  $\beta$ -compounds; thus,  $\text{CH}_3\text{CH:CHCH}_3$  =  $\alpha$ -dimethylethylene;  $\text{CH}_2\text{:C}(\text{CH}_3)_2$  =  $\beta$ -dimethylethylene. Similarly, use names such as methylacetylene and dimethylacetylene for the homologues of acetylene of the form  $\text{CH:C}_n\text{H}_{2n+1}$  and  $\text{C}_n\text{H}_{2n+1}\text{C:C}_n\text{H}_{2n+1}$ . Adopt the name *allene* for the hydrocarbon  $\text{CH}_2\text{:C:CH}_2$ , and indicate the relation which its homologues bear to it in the same manner as pointed out for acetylene.

6. Distinguish all alcohols, *i. e.*, hydroxyl-derivatives of hydrocarbons, by names ending in *ol*, *e. g.*, quinol, catechol, resorcinol, saligenol, glycerol, erythrol, mannitol, instead of hydroquinone, pyrocatechin, resorcin, saligenin, glycerin, erythrite, mannite. Compounds which are not alcohols, but which are at present distinguished by names ending in *ol*, may be represented by names ending in *ole*, if a systematic name cannot be given. For example, write indole instead of indol; furfuraldehyde instead of furfural; fucusaldehyde instead of fucosol. Ethers derived from phenols, such as  $\text{C}_6\text{H}_5\text{OCH}_3$ , etc., hitherto called anisol, anethol, etc., may be distinguished by names ending in *oil*, as anisoil and anethoil.

Alcohols should be spoken of as mono-, di-, tri-, or *n-hydric*, according to the number of OH groups.

7. Bodies such as the acids of the lactic series containing the group (OH) should be termed *hydroxy*-, and not oxy-derivatives, *e. g.*, hydroxyacetic and not oxyacetic acid. Compounds containing the analogous groups  $\text{C}_2\text{H}_5\text{O}$ ,  $\text{C}_6\text{H}_5\text{O}$ ,  $\text{CH}_3\text{COO}$ , etc., should in like manner be termed ethoxy-, phenoxy-, acetoxy-derivatives. Thus ethoxypropionic acid instead of ethyllactic acid; 3:4 diethoxybenzoic acid instead of diethylprotocatechuic acid; and acetoxypropionic acid instead of acetylactic acid. Terms such as diethylprotocatechuic acid should be understood to mean a compound formed by the displacement of hydrogen-atoms in the hydrocarbon radicle of protocatechuic acid by ethyl, viz.,  $\text{C}_6\text{H}(\text{C}_2\text{H}_5)_2(\text{OH})_2\text{COOH}$ , and not  $\text{C}_6\text{H}_3(\text{OC}_2\text{H}_5)_2\text{COOH}$ , just as dibromoprotocatechuic acid is understood to be the name of a compound of the formula  $\text{C}_6\text{HBr}_2(\text{OH})_2\text{COOH}$ .

8. The term *ether* should be restricted to the oxides of hydrocarbon radicles, and the so-called compound ethers should be represented by names similar to those given to the analogously constituted metallic salts.

9. Compounds of the radicle  $\text{SO}_3\text{H}$  should, whenever possible, be termed *sulphonic* acids, or, failing this, *sulpho-compounds*: as benzenesulphonic acid, sulphobenzoic acid, and not sulfi-compounds. Compounds of the radicle  $\text{SO}_2\text{NH}_2$  should be termed *sulphonamides*.

10. Basic substances should invariably be indicated by names ending in *ine*, as aniline, instead of anilin, the termination *in* being restricted to certain neutral compounds, viz., glycerides, glucosides, bitter principles and proteids, *e. g.*, palmitin, amygdalin, albumin. The compounds of basic substances with hydrogen chloride, bromide or iodide, should always receive names ending in *ide* and not *ate*, as morphine hydrochloride and not morphine hydrochlorate.



## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

*A Pamphlet on the relation to each other of Education and Examination, especially with regard to Pharmacy in Great Britain.* By Professor Attfield, F.R.S., etc. London, 1882. Svo, pp. 97.

The education of the pharmacist should be two-fold: *technical*, which is acquired in the store and laboratory, from the handling of and manipulation with the numerous medicinal articles, and *general or scientific*, such as is obtained through systematic study, theoretical as well as practical. There is no "short cut" to the acquisition of knowledge; the student must learn to see and to investigate, mentally as well as practically, and to acquire this habit and turn it to useful account requires methodical training of the mind, which alone can afford the requisite clearness of perception and soundness of judgment. When these have been reached the student will be able to help himself along and he will not rest satisfied with what he reads and hears, but by proper inquiry will convince himself of the correctness of statements, and in this manner will become master of the subject.

Examinations are intended to test the soundness and extent of the knowledge of the candidate, and, judiciously conducted, will succeed in this purpose to a certain extent. But they should be regarded merely as a rough test of attainment; for at the very threshold of this test we are met with the system of "preparing for examination," which unfortunately prevails to a very large extent in the elementary schools, and is more or less unconsciously carried into collegiate and academical institutions. The temporary "cramping" of the students' mind with facts may and often does succeed in carrying him safely through the examinations, and may be, ahead of his competitors, where competitive examinations exist; yet the knowledge upon which the result has been attained is only delusive, because transient, and sooner or later forgotten, while that acquired by the patient student lasts and accumulates, even though the retentive powers of his memory be less brilliant.

Such teaching which merely aims to fit the student for passing the ordeal before the examiners is what Professor Attfield very aptly terms adapting the system of education to the system of examination. He shows the unsoundness of such an adaptation, and that thereby neither the public nor the students derive any lasting benefit. To attain this latter end he earnestly pleads for the reversed condition, the adaptation of examination to education, that is to say, to make the former dependent upon the latter; and in this view we heartily concur.

We cannot close this brief review of Professor Attfield's excellent pamphlet, in which American pharmacists will find much that is of valuable application for the present and more particularly for the future,—without quoting a sentence or two from the author's remarks on certain points raised by his correspondents:

"A principle which should be commonly accepted is that while technical and general education and examination should be carried on by different men or different bodies of men, both the men or bodies of men should

be under the direction and control of the followers of the calling—in this case pharmacists, who indeed are alone qualified to direct and control matters pharmaceutical. Let pharmacists lose control over what is now defined as general pharmaceutical education, and where is the guarantee that it will not be superseded by superficial and ephemeral instruction? Let them lose control over pharmaceutical examination, and where is the guarantee that it will be fitted to the requirements of pharmacy?"

*Handwörterbuch der Pharmacognosie des Pflanzenreichs.* Von Professor Dr. G. C. Wittstein. Breslau: Eduard Trewendt. 1882. 2. Lieferung.

Dictionary of Pharmacognosy of the Vegetable Kingdom. Part 2.

*Die Naturgeschichte des Cajus Plinius Secundus.* Von Professor Dr. J. C. Wittstein. Leipzig: Gressner & Schramm. 11. Lieferung.

Plinius' Natural History. Part 11.

Both works have been fully noticed before. The first one has reached the article "Gundelrebe" (*Glechoma hederacea*, *Lin.*); the latter to book xxvii. The value of both becomes even more apparent as the publication progresses.

*Proceedings of the Connecticut Pharmaceutical Association at the Sixth Annual Meeting*, held in Bridgeport, February 7th and 8th, 1882. 8vo, p. 87.

*Proceedings of the Convention of Druggists, also of the Massachusetts Pharmaceutical Association. First Annual Meeting*, Worcester, May 17, 1882. 8vo, pp. 80.

*Proceedings of the Preliminary and First Annual Meetings of the Virginia State Pharmaceutical Association*, held in Petersburg, January 4, and 5; and Richmond May 16, and 17, 1882. 8vo, pp. 39.

*Proceedings of the Third Annual Meeting of the Kansas Pharmaceutical Association*, held in Topeka, June 8, 1882. 8vo, pp. 14.

Accounts of these meetings will be found in this volume, pages 91, 139, 328 and 332.

*Eleventh Annual Report of the Alumni Association of the College of Pharmacy of the City of New York.* 1882. 8vo, pp. 62.

The pamphlet contains minutes of the meetings, several papers read, commencement exercises, etc.

*American Medicinal Plants; an illustrated and descriptive guide to the American plants used as homœopathic remedies; their history, preparation, chemistry and physiological effects.* By Charles J. Millsbaugh, M. D. New York and Philadelphia: Boericke & Tafel. 4to. Part 1. Price \$1 per number.

An illustrated work on American medicinal plants will be a welcome addition to our literature, because it is needed. The work under consideration will not contain all the American plants to which medicinal properties are ascribed, but only those which are recognized in homœopathic practice; yet their number will be about 180 or more, and the work will therefore contain many plants in addition to those recognized in the United States Pharmacopœia. It is contemplated to publish the work by subscription in about thirty numbers, each of which, we suppose, to contain six plates.

That number of plates is at least contained in the first part now before us, namely, *Sanguinaria canadensis*, *Inula Helenium*, *Apocynum androsaemifolium*, *Asclepias Cornuti*, *Symplocarpos foetidus*, and *Iris versicolor*.

The illustrations are made from original colored drawings made by the author from the living plants, and must be pronounced as handsome and acceptable, so that the plants themselves may be readily recognized by them, although the colors are in most cases rather too bright, and certain morphological characteristics are not properly indicated; for instance, the ray florets of *Inula* should be three-toothed instead of tapering to an acute point, the corolla lobes of *dogbane* should be more revolute, and the foli-  
cles of the milkweed should be marked with spinous projections, and less tapering.

The botanical descriptions are, in our opinion, far too brief for a work of this kind, and do not in the least compare, for instance, with the detailed characters as given in Bentley and Trimen's work; in fact, the descriptions are essentially those given by Gray, in some cases still more abridged.

The pharmacognostical and chemical descriptions are in most cases quite familiar to us, though we recognize no resemblance in the mode of wrinkling of the rootlets of skunk cabbage and the roots of *ipeacuanha*, nor can we believe that the rhizomes of *Iris versicolor* and *Calamus* can be confounded except in name, they being popularly known as blue flag and sweet flag. *Rhœadine* (not *rhœdinia*) was never known as *porphyroxin*; but *Merek's* principle of the latter name was a mixture which owed its color reaction with acids to *Hesse's rhœadine*. *Inulin* is not a bitter principle, but has an insipid taste.

The physiological properties of the plants are very briefly given, but perhaps sufficiently stated for the scope of the work. In fact, we regard its scope as botanical rather than pharmacognostical or medical, and as such it deserves success. The morphological inaccuracies of the drawings can readily be obviated in the succeeding plates, and the value of the work for botanical purposes be increased by giving full descriptions of the plants in the place of brief diagnostic characters. The letter-press is quite commendable.

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*Catalogue of the Materia Medica, Pharmaceutical Preparations, Patent and Proprietary Medicines, with the uniform prices of the Orleans Pharmaceutical Association.* August 1, 1882. New Orleans: L. Graham and Son. 8vo, pp. 88.

A neat pamphlet, printed on writing paper, ruled in columns for noting prices. It is, we believe, the first practical result of the organization of the society and aims at "promoting friendly feelings, and banishing unworthy jealousies." Establishing uniformity in the retail prices of the above classes of medicines is a desirable end which should be worked for in all localities where the unwise and unbecoming practice of "cutting" is observed. It evinces a laudable spirit when the committee states: "We feel that we have been just to ourselves, and then generous to our customers."

*Mental Pathology and Therapeutics.* By W. Griesinger, M.D., Professor of Clinical Medicine and of Mental Science in the University of Berlin, etc. Translated from the German (second edition), by C. Lockhart Robertson, M.D. Cantab., and James Rutherford, M.D. Edinb. New York: Wm. Wood & Co. 1882. 8vo, pp. 375.

The work is divided into 5 parts or books, treating of general considerations, the origin, forms, pathological anatomy, prognosis and treatment of mental disease. The author is one of the leaders of the German school of medical psychology. In this translation, which was made in 1867, it has been the endeavor to give the English reader an accurate and literal rendering of the German text.

*A Treatise on the Physiological and Therapeutical Action of the Sulphate of Quinine.* By Otis Frederick Manson, M.D., Professor of Physiology and Pathology in the Medical College of Virginia. Philadelphia: J. B. Lippincott & Co. 1882. 12mo, pp. 164. Price \$1.

After referring to the discovery of quinine the history of its introduction in medicine is briefly alluded to, after which the action of quinine upon animals and man is considered, with observations on the various modes of administration, and the effects of small and excessive doses. This is followed by a chapter on the therapeutics of quinine sulphate. The little volume appears to have been carefully prepared, and the current and past literature on the subject to be well utilized. The total absence of a table of contents and of an index interferes with the usefulness of the work.

*What to do in cases of Poisoning.* By William Murrell, M.D., Lecturer on Materia Medica and Therapeutics at the Westminster Hospital, etc. Second edition. Detroit: Geo. S. Davis, 1882. 32mo, pp. 96. Cloth bound, embossed sides, colored edges. Price \$1.

A little volume which may be conveniently carried in the pocket, and designed to give brief practical directions for the treatment of cases of poisoning. A list of the requisite instruments and remedies to be kept in the antidote bag, ready for use in case of emergency, is first given, after which the various poisons are considered in alphabetical order, the remedial agents being indicated by broadfaced type.

*Second Annual Report of the Astronomer in charge of the Horological and Thermometric Bureaus in the Observatory of Yale College.* 1881—1882.

Perhaps the most interesting portion to physicians and pharmacists of this report is the one on thermometers. During the past year 3,811 physicians' and 741 other thermometers were examined; such as have been used for a year or more give usually misleading indications.

*Zur Frage der dem Fischeleben schädlichen Flachsweichen.* Von Edwin Johanson.

On the noxious influence of the water-retting of flax upon fish-life.

The experiments of the author lead to the conclusion that the sickness and death of fishes in creeks used for flax-retting is due to the rapid disappearance from the water of oxygen during the process.

*Report on Surgery.* By Professor W. O. Roberts, M.D. Louisville. Pp. 16. A reprint from the "American Practitioner," June, 1882.